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EDITORIAL

I TRY TO HAVE AN OPEN MIND

The familiar phrase "I try to have an open mind" causes a lot of misunderstanding—including the problem that Bill Blow, who honestly means it when he says "I try to have an open mind," feels hard put upon when others don't accept his statement. Others, of course, observe that Bill does *not* have an open mind—we will assume for the argument that Bill doesn't—and react on that basis. This makes Bill mad. Bill's anger makes everybody else mad. Naturally, they part the best of enemies.

The trouble, I suspect, is this: Bill is, indeed, in full honesty, trying to have an open mind. But . . . 1. *Trying to have* is not fully equivalent to *having*. 2. Neither Bill nor his friends-who-become-enemies take that into account adequately. 3. The most sincere, all-out, honest try does *not* automatically mean success. 4. Neither Bill nor his neighbors adequately allow for that fact.

Bill is, subconsciously, holding that the fact of his effort must mean that he does in fact have an open mind; therefore his neighbors are nuts when they believe what he, open-minded Bill Blow, can't believe.

His neighbors, on the other hand, agree in full—if wrongly—that a really sincere effort to have an open mind means that you will inevitably have an open mind. And they then observe that Bill does not have an open mind, so, logically, conclude that he isn't even trying. That he's a bigoted liar when he says he is trying.

Trouble is, you can try real hard to lift a cubic foot of cast iron off the floor—make a real, honest, sincere all-out effort. You can also try using your mental powers to levitate it. In each case, the result, so far as moving that cubic foot of iron, will be about the same. There are probably a few human beings who could lift it in the usual fashion, and a few who could levitate it. And this would, of course, prove that everybody else who didn't do so hadn't really been trying.

Failure doesn't prove lack of ef-

fort. Success doesn't prove effort, either, incidentally—a fact that the successful individual is very apt to overlook. I might give an empty cigarette pack a wild, left-handed pitch over my right shoulder, have it falling toward the floor just as the dog wandered by, tail wagging, and batted it onto the table. If it landed on the cat sleeping on the table, startling her awake, and she knocked it into the wastebasket . . . see, it demonstrates conclusively that I can, with a wild left-handed pitch cause the cigarette pack to land in the wastebasket. Unarguably true; it's a demonstrated fact, and a fact is simply not open to argument.

If by an equally wild left-handed mental pitch, you have somehow achieved "an open mind"—you are, maybe, superior to Bill Blow, because you succeeded where he failed?

When it comes to the mental level, things aren't so dog-goned simple as they are at the physical-action level. A claustrophobe may try not to be scared silly in an elevator; he may acknowledge with complete and sincere conviction that he should not be. He may make great efforts not to be. But he still walks up seventeen flights of stairs to reach an office he has to visit.

It is a fact-of-reality that he *is* overwhelmed by fear when he's in an elevator—that, *as a fact,* is as unarguable as the fact that there is something we call gravity. Now inasmuch as you can use logic *about* a fact, but logic won't *change* the fact . . . logic isn't going to change the fact he's scared. This is *not* saying that the fact should not be changed; it's a simple acknowledgment that it can't be changed—that way.

Now if you have an open mind, and I do not . . . please; you tell me how you achieve it, will you? Since you're the one that has the achievement, and I am not, it is your responsibility to explain how it's done, not mine to work it out, isn't it?

But don't tell me you did it by logic! I have personal experience that that doesn't work; I've tried the technique on myself, I've tried it on others, and I've watched others try it on themselves and on others. Logic is mighty useful—but so's a hammer, even though it's acknowledged that a hammer isn't a satisfactory tool for getting a cork out of a champagne bottle.

No matter how sincerely, how thoroughly a man tries to have an open mind, he can't make himself by any known technique. If you have an open mind . . . lucky you. Don't claim you earned it, though, unless you can teach it to someone else.

Now an additional little problem on this is "How open should a mind be?" John Doe may say that Richard Roe is a superstitious fool—a gullible sucker for anything. And Richard Roe says John Doe is a bigoted, prejudiced, closed-mind conservative.

There is such a thing as genetic

insanity, and I can prove it. The Pekinese dog has a genetic insanity; they've been bred for generations to produce a completely fearless animal. The effort has met with such success that a Pekinese will attack a Mastif, an Irish Wolfhound, or a lion, no doubt, without provocation. The Pekinese is very open-minded about his own capabilities. He's completely fearless . . . and consequently remarkably unteachable.

A mind incapable of distrust is a mind just as thoroughly insane as a mind incapable of trust; an animal incapable of fear is insane, as insane as an animal that fears everything equally and overwhelmingly. The essential problem of living organisms is to find a proper, workable balance of trust and distrust, of self-evaluation and other-evaluation. A man who trusts himself completely, and trusts no one else at all, is paranoid; one who trusts others and distrusts himself completely is a spineless acolyte.

The problem of the open mind, I think, is a problem of how to handle trust and distrust. That's a decidedly tricky problem, and one that's a long, long way from solution.

One of the difficulties is that there must be internal and external balances of trust-distrust. Sure, a scientist is *supposed* to take nothing for granted . . . but let's use a modicum of good sense about this, shall we? Have you, personally, ever directly measured the acceleration of gravity, going back to fundamental methods? Have you yourself, using apparatus you built yourself, calibrated from fundamental standards yourself, ever measured the charge to mass ratio of the electron?

And how far would science get if every scientist *did* take nothing on trust? No voltmeters allowed, unless you personally calibrate them yourself against absolute standards. And since you can't trust yourself either, that won't get you anywhere, so let's drop science down the drain, shall we?

Evidently, trust is going to be essential to actual living. But not too much trust. I understand there was a graph of amount of movement vs. hours-during-sleep published once back about 1915, which was republished and republished in textbooks and later papers for some thirty years before someone went back to the original paper, and discovered the graph had been misdrawn in that paper. The graph didn't match the tabulated data from which it was specifically supposed to have derived, and no one had reperformed the experiments.

The easy way to avoid problems of trust-distrust is to reject any new data. Distrust it at the level of "I don't believe it exists." There is then no need for an internal trust-distrust tension; you trust everything inside your own sphere of accepted data—your own, personal data "in-group"—and distrust all external data.

This is remarkably similar to the

(*Continued on page* 161)

PANDORA'S PLANET

The Invaders had "conquered" Earth—but there's something worse than catching a bear by the tail. How about catching a werewolf by the tail?

BY CHRISTOPHER ANVIL

Illustrated by Freas

Klide Horsip, Planetary Integrator, prided himself on being much more than a jailer. Each advance of the Integral Union meant more occupied planets, and each one of these planets, like a single tiny component in a giant magnet, must be brought into line with the rest. This was Klide Horsip's job, and he settled to it now with relish.

"Phase I is *complete*?" he insisted, emphasizing the word.

Brak Moffis, the Military Overseer, smiled ruefully. "Not quite as complete as it often is on these humanoid planets."

"Then give me a brief summary of the details," said Horsip. He cast a quick glance out the landing-boat's window at the curve of the blue and green world below. "Looks promising enough."

"Well," said Moffis, "as far as that goes, it is. It's a Centra-type

planet, mean diameter about 0.8, with gravity, oxygen, and temperature ideally suited to human and humanoid life. The percentage of water surface is higher than on Centra—about seventy-five per cent—but it's well distributed, and helps moderate the climate. There are plenty of minerals, including massive quantities of deep nickel-iron that hasn't yet been touched."

Horsip nodded. "And the inhabitants?"

"The usual types of plant and animal life—and, the humanoids."

"Ah, we come to the main point. What stage were the humanoids in when you landed?"

Brak Moffis looked at Horsip and gave a wry smile. "Technologically," said Moffis, "they were very near Centra 0.9, and in some areas higher."

"You aren't serious?"

The Military Overseer shook his head and looked away. "You wouldn't ask me that if you'd been in on the invasion. Perhaps you've heard of *Centralis II?*"

"The hell-planet! Who hasn't heard of it?" Horsip let his voice show impatience. "What of it?"

"Well," said Moffis, "that gives us ground for comparison. This was worse. Thirty per cent of the Initial Landing Parties were vaporized the first day. Another fifty per cent had their sites eliminated by the second day, and were pinned to the earth that day or the day after. The whole second wave had to funnel through the remaining twenty per cent of sites in isolated regions, and of course that meant the natives retained effective control of the situation everywhere it counted. If you'll imagine yourself wrestling one of the giant snakes of Goa, you'll have a good idea of our position." He raised a hand as Horsip, frowning, started to speak. "Let me summarize. Thirty per cent of our selected sites were eliminated, fifty per cent were in desperate straits, and the remaining twenty per cent were jampacked, overloaded, and only meant for secondary purposes in the first place. All this, mind you, despite the fact that the natives let off a couple of incomplete attacks on *each other* during the initial stages."

"Hysteria?" scowled Horsip.

"Regional rivalries," said Moffis.

"Well," said Horsip, "give the censorship another silver nova for efficiency. All I ever heard of this was that it was proceeding 'according to schedule.'"

"It was," said Moffis, "but it wasn't our schedule."

"I see," said Horsip, his face disapproving. "Well, what did you do?"

"Organized our established sites as fast as possible, and improvised new ones in chosen locations connecting the outer sites to form a defensive perimeter."

"*Defensive!*"

"That was what it boiled down to."

"What about the other sites—the fifty per cent under attack?"

"We supplied them as well as we

could. When we were built up enough, we started a heavy thrust to split the enemy—I mean, native-forces—and at the same time ordered a simultaneous break-out of the surrounded units toward common centers. The idea was to build up strong enough groups so they could fight their way to the perimeter."

"You were actually *giving up* the original sites?" Horsip looked at the Military Overseer with an expression of offended disbelief.

Moffis looked back coldly. "I'm telling you all this in detail so you'll understand it wasn't the usual matter of slaughtering a molk in a stall, and so you'll be ready in case *you* run into anything. I'm telling you we had a rough tossing around in the beginning. Maybe you'll have a better idea when I tell you one of our northern groups of Initial Landing Parties ran into this routine:

"The natives vaporized the center of each site with a nuclear bomb, contained the troups remaining in each site with minimum forces, then switched a heavy reserve from one Landing Party to the next, slaughtering them one-after-the-other, in succession. This wasn't brilliance on their part; this was their usual level of performance."

Horsip swallowed and looked serious.

Moffis noted Horsip's reaction and nodded. "I'm no more used to being on the defensive than you are, and I can assure you I didn't enjoy a minute of it. But that's what we were up against. We managed to recover just one large group—about eighteen per cent—of the original Landing Parties, then we pulled back into our perimeter under heavy attack. We had to bring the Fleet down into the atmosphere to get at their communications. At that the ships took losses of better than one-in-five despite the meteor guards. It was touch-and-go for three weeks, then we got the edge, and by the end of the month we had them hamstrung. Then we had some terrific fighting when we broke out of the defensive perimeter. But we won. At the end, we crushed them piecemeal."

"How long did this take?" asked Horsip.

"A hundred and twenty-seven of the planet's days," said Moffis. "Their day is roughly the same length as a day on Centra."

"I see," said Horsip, "and ten to twelve days is considered average."

"Averages don't count with something worse than *Centralis II*."

Horsip looked out at the planet, growing big as the landing boat swung closer. As he watched, he saw a region of pits and craters, a part of the globe that looked as if an angry giant had beat on it with a sledge hammer. He turned away, as if to change the subject.

"What," he asked, "do these humanoid natives look like?"

"A lot like us. They have a pair of anterior and a pair of posterior appendages, one head, and no functional tail. They walk upright, and

have opposable thumbs on the anterior appendages."

"Any significant marking-differences?"

Moffis swallowed. "A few."

"Good," said Horsip, relaxing a bit. "That will save us the trouble of marking them." When Moffis remained quiet, Horsip turned impatiently. "Well, don't just sit there. Enumerate them. What are the differences?"

"A bigger skull," said Moffis, "with a larger brow and a less prominent nose. The females are practically hairless over the greater portion of their bodies, and so are the males, though in less degree."

"Very good," said Horsip, nodding approval. "What else?"

"The vestigial tail is almost completely absorbed. There's no visible stump at all. And the head is set more nearly erect on the body."

"Splendid! Yes, very good indeed." Horsip looked vastly pleased. "You realize the implications?"

"I don't see anything good about it," said Moffis.

"Oh, come, man," said Horsip. "You've had a difficult experience, but don't let it distort your values. This is a propitious start for Planetary Integration. These folk are self-marked, by nature. We'll have no mixed-race trouble here, nor any of the usual marking difficulties, either."

Horsip paused in thought, snapped his fingers and added, "For instance, look at the words that apply to these natives: big-headed, hairless, flat-nosed—"

"But they aren't flat-nosed."

"What does that matter? Didn't you say their noses were smaller?"

"Well, yes. But not flat."

Horsip waved his hand. "Never mind that. We'll call them flat-nosed. Now let's see. Big-headed, hairless, flat-nosed. Wasn't there another—"

"Tailless," supplied Moffis, without enthusiasm.

"Yes, *tailless*. Well" — Horsip leaned back, and a smile of creative enjoyment crossed his face—"we'll call them 'Puff-skulled, hairless, flat-nosed, lop-tails.' Let's see any of our rowdy young bloods try to mate with them after that!"

"They will," said Moffis tonelessly.

"But not officially," said Horsip. "And that's what counts." He looked down with pleasurable anticipation at the planet grown large beneath them. He rubbed his hands. "Well," he said, "this is going to be pleasant work. A treat, Moffis."

Moffis shut his eyes as if to ease a pain.

"I hope so," he said.

A strong guard of heavily-armed soldiers awaited them in the landing area, itself ringed by several formidable lines of spike-bar barriers, thickly sown with leaping-mine trip wires, and covered by deeply dug-in splat-gun emplacements.

Horsip looked the defenses over curiously as he walked with Moffis to a heavily-armored ground-car. He

noted that the soldiers carried out their orders readily enough, but without a certain verve usual on newly-conquered planets. "Trouble?" he asked.

Moffis glanced around uneasily. "Roving bands," he said. "You think you've got them wiped out, and they pop up again somewhere else."

They got into the ground-car, an order was shouted outside, and the convoy began to move off. It wound out onto the road like a giant chuffing snake, moving jerkily as gaps opened and closed between vehicles. The going was bumpy till they got out onto the main road, then the cars moved smoothly along. At this stage, Horsip raised up to peer out a shuttered slit in the side of his vehicle. For a hundred yards back from the side of the road, the vegetation was a burnt black. He scowled.

Moffis read his thoughts. "Yes, clearing the roadside *is* an unusual precaution. But it's either that or get plastered with a can of inflammable liquid when you go by in the car."

"Such an unnecessary width might indicate fear to the natives."

Moffis suppressed a snort.

Horsip looked at him coldly. "Isn't that so?"

"Maybe," said Moffis. "And maybe it indicates fear to a molk when you put heavier bars on his stall. But the main idea is, not to get gored."

"We've already conquered these lop-tails."

"Some of them don't know it yet. That's the whole trouble."

"We won't convince them by acting frightened."

"We won't convince them by being dead, either."

Horsip looked at Moffis coldly. His heavy brows came together and he opened his mouth.

There was a dull boom from somewhere up ahead. Their car slowed suddenly, swerved, and then rolled forward so fast they were thrown hard back against the cushions. Something *spanged* against the side of the car. The snapping *whack* of a splat-gun sounded up ahead, was joined by others, and rose to a crescendo as they raced forward and passed to one side of the uproar. Acrid fumes momentarily filled the car, making Horsip cough and his eyes run. Somewhere in the background there was an unfamiliar hammering thud that jarred Horsip's nerves. There was another explosion, and another, now well to the rear. Then the car slowed with a loud squeal from the machinery. Horsip was thrown forward, then slammed back hard as the car raced ahead again. As they settled into a fast steady run, he turned to Moffis with a thoughtful frown. "How much farther do we have to go?"

"We should be about a quarter of the way."

Horsip sat, pale and thoughtful, beside Moffis, who sat, pale and gloomy, all the way to Horsip's new headquarters.

The site of the new headquarters was not well chosen to convey the

effect of untouchable superiority. The site consisted of a large, blackened mountain with a concrete tunnel entrance at the base. The mountain bristled with air-defense cannon, was pocked and lined with shellholes, trenches, bunkers, and spike-bar barriers. Around the tunnel entrance at the base, the barriers, cannon, and splat-gun emplacements were so thick as to excite ridicule. Horsip was about to comment on it when he noted a huge thing like a monster turtle some hundred-and-fifty yards from the entrance. He felt the hair on his neck, back, and shoulders bristle.

"What's that?"

Moffis peered out the slit. "One of the humanoids' traveling forts."

Horsip stared at the long thick cannon that pointed straight at the tunnel entrance. He swallowed. "Ah . . . is it disarmed?" The ground-car's armor plating suddenly seemed very thin. "It is, isn't it?"

Moffis said, "Not exactly. Our engineers are studying it."

"You don't mean the humanoids are still in *control* of it?"

"Oh, no," said Moffis. "The concussion from our bombardment apparently killed them. Our experts are *inside* it, trying to figure out the mechanism."

"Oh." Horsip, as his angle of view changed, saw an armored ground-car gradually come into sight, parked near the alien fort. He damned himself for his scare. Of *course,* the thing was disarmed. But he could not help noticing how ineffectual the ground-car looked beside it. He cleared his throat.

"How many of those, ah, 'moving forts' did the humanoids have?"

"Hundreds of them," said Moffis.

They rode in silence through the massive concrete entrance, and Horsip felt an unexpected sense of relief as the thick layer of earth, rock, and cement intervened between himself and the alien world. They rode downward for a long distance, then got out of the ground-car. Moffis showed Horsip around his new headquarters, which consisted of a large suite of rooms comfortably fitted-out; several outer offices with files, clerks, and thick bound volumes of maps and data; and a private inner office paneled in dark wood, with Horsip's desk and chair on a raised dais, and a huge flag of Centra hanging behind it.

Horsip looked everything over in complete silence. Then he looked again around the private office at the desk, dais, and flag. He cleared his throat.

"Let's go into my suite. Do you have the time?"

"I suppose so," said Moffis gloomily. "There isn't a great deal I can do, anyway."

Horsip looked at him sharply, then led the way back to his suite. They sat down in a small study, then Horsip got up, scowling intently, and began to pace the floor. Moffis looked at him curiously.

"Moffis," said Horsip suddenly, "you haven't told me the whole story."

Moffis looked startled.

"Go on," said Horsip. "Let's have it."

"I've summarized—"

"You've left out pieces. Perhaps you've told me the facts and left out interpretations. We need it all." He faced Moffis and pinned him with his gaze.

"Well—" said Moffis, looking uncomfortable.

"You're my military deputy," said Horsip, his eyes never leaving Moffis. "You and I must work together, each supplying the other's lacks. The first rule of planetary integration is to apply the maximum available force, *in line with itself*. If you apply force in one direction, and I apply force in another direction, the result will be less than if we both apply force in the same direction. That can be proved.

"Now," he said, "you have had a difficult time. You hit with all your strength, and the blow was blunted. The natives showed considerable low cunning in using the brute force at their disposal. Because we are accustomed to swift victories, the slowness of your success discouraged you. I was somewhat surprised at the situation myself, at first.

"However," said Horsip, his voice swelling, "a molk is a molk no matter how many bars he kicks off his stall. He may put up a struggle. It may take twenty times as long as usual to strap his neck to the block and slam the ax through. But when he's dead, he's just as dead as if it was over in a minute. *Right?*"

"Truth," said Moffis, looking somewhat encouraged.

"All right," said Horsip, pacing. "Now, we've got this molk into the stall, but apparently we're having some little trouble getting his head in the straps. Now, we can't strap a molk in the dark, Moffis. The horns will get us if we try it. We've got to have light. You've got to light up the beast for me with the lantern of knowledge, Moffis, or I can't do my part. How about it?"

"Well," said Moffis, looking interested and sitting forward on the edge of his chair, "I'm willing, now you put it that way, but where should I start?"

"Start anywhere," said Horsip.

Moffis cleared his throat, and looked thoughtful.

"Well, for one thing," he said at last, "there's this piecemeal filing-down they're doing to us." He hesitated.

"Go on," prompted Horsip. "Talk freely. If it's important, tell me."

"Well," said Moffis, "it doesn't *seem* important. But take that trip from the landing boat to here. That wasn't a long trip, yet they knocked out at least one ground-car. If it was the same as other trips like it, they would have put fifteen men out of action, and three ground cars, at least. Suppose we have three hundred men and fifty ground-cars we can spare as escort between here and the landing-boat place. Each time, they're likely to get hit once, at least. It seems like just a small battle. Not

even a battle—just a brush with some die-hard natives.

"But in two trips, we've lost one man out of ten and one car out of eight."

Moffis paused, frowning. "And the worst of it is, we can't put it down. It's like a little cut that won't stop bleeding. If it just happened here, it would be bad enough. But it happens everywhere and anywhere that we don't have everything screwed down tight."

"But," said Horsip, "see here. Why don't you gather together five thousand men and scour that countryside clean? Then you'll have an end to that. Then, take those five thousand men and clean out the next place." He grew a little excited. "That's what they did to our landing parties, isn't it? Why not spring their own trap on them?"

Moffis looked thoughtful. "We tried something like that earlier, when all this started. But the wear on the ground-cars was terrific. Moreover, they moved only a few scores of men, and we had to move thousands. It was wearing us out. Worse yet, as they only had small bands in action, we couldn't always find them. We'd end up with thousands of men milling around in a little field, and no humanoids. Then, from somewhere else, they'd fire into us." Moffis shivered. "We tried to bring the whole army to bear on them, but it was like trying to shoot insects with a cannon. It didn't work."

"Well," said Horsip, "that was too bad; but still, you had the right idea. But you overdid it."

"I wouldn't be surprised," said Moffis. "None of us were in very good form by then."

Horsip nodded. "But look here, take five thousand men, break them up into units of, say, five hundred each. Train the units to act alone or with others. Take six of the units, and send them to troubled places. Hold the other four in your hand, ready to put them here or there, as needed."

Moffis looked thoughtful. "It sounds good. But what if on their way to the trouble place, *these* men get fired on?"

Horsip suppressed a gesture of irritation. "Naturally, the five hundred would be split up into units. Say it was ten units of fifty men each. One fifty-man unit would clean out the nest of snakes, and the rest would go on. When they were finished, the unit that had stopped would go after the rest."

Moffis nodded. "Yes, it sounds good."

"What's wrong then?" demanded Horsip.

"The natives' stitching-gun," said Moffis dryly.

"The which?" said Horsip.

"Stitching-gun," said Moffis. "It has a single snout that the darts move into from a traveling belt, like ground-cars on an assembly line. The snout spits them out one at a time and they work ruin on our men. If this five-hundred man team you speak of was hit on the road, and

just fifty men from it tried to beat the natives, we'd probably lose all fifty. The only way to win would be to stop the whole five hundred, and let the men fire at them from inside the ground-cars."

"But, listen," said Horsip. "Just how many natives would they be fighting?"

"Twenty, maybe."

Horsip did a mental calculation. "Then you mean one of their men is worth two to three of ours?"

"In this kind of fighting, yes."

Horsip made a howling sound in his throat, let out the beginning of a string of oaths and cut them off.

"I'm sorry," said Moffis. "I know how you feel."

"All right," said Horsip angrily, raising his hand and making gestures as if brushing away layers of gathering fog, "let's get back to this stitching-gun. It only shoots one dart at a time. How does that make it better than our splat-gun, that can shoot up to twenty-five darts at a time?"

"I don't understand it exactly," said Moffis, "but it has something to do with the way they fight. And then, too, the stitching-gun shoots the darts out *fast*. It shoots a *stream* of darts. If the first one misses, the humanoid moves the gun a little and maybe the *next* one strikes home. If not, he moves it a little more. This time, five or six darts hit our man and down he goes. Now the humanoid looks around for someone else and starts in on him. Meanwhile, another humanoid is feeding belts of darts into the gun—"

"But our splat-guns!" said Horsip exasperatedly. "What are *they* doing all this time?"

"They're heavy," said Moffis, "and it takes a little while to get them into action. Besides, the enemy . . . I mean, the humanoids . . . have had all night to set *their* gun up and hide it, and now they pick out their target at will. We have to stop the vehicles to go into action. And that isn't the worst, either."

"Now what?"

"The splat-gun operators can't see the enemy. I mean, the humanoids. They'll be dug in, and concealed. When the gunners do realize where they are, as likely as not the splat-guns can't get at them, because there is nothing but the snout of the stitching-gun to fire at. It's likely to be someone firing from inside the ground-cars that finally picks off the humanoids."

Horsip looked at Moffis thoughtfully. "Are there many more difficulties like this?"

"The planet is full of them," said Moffis. "It seems like heaven compared to what it was when the full-scale fighting was going on, but when you get right down to it, it's hard to see whether we've made any headway since then or not. The maddening part of it is, we can't seem to get a grip on the thing." He hesitated, then went on. "It's too much like trying to wear down a rock with dirt. The dirt wears away instead."

Horsip nodded, made an effort,

and looked confident. "Never mind that, Moffis. You've got the molk in the stall for us. He's still kicking, but that just means there's so much the more meat on him."

"I hope so," said Moffis.

"You'll see," said Horsip, "once Planetary Integration gets started on the job."

The staff of Planetary Integration came down on the planet the next day. Soon they were coming in from the landing field in groups. They were talkative people, waving their hands excitedly, their voices higher-pitched than most. Their faces were smug, and in their eyes was a glint of shrewdness and cunning as they regarded the new world around them. Moffis did not look especially confident at their arrival, but Horsip brimmed over with energy and assurance. He began to put the problems to them:

First, what to do about the ambushing on the road?

The answers flew thick as dust in summertime.

Small forts and splat-gun nests could be built along the chief roads. Light patrols could scour the fields alongside to seek out the lop-tails before they got their guns in place. Strips of leaping mines could be laid alongside the roads at a distance, so the lop-tails would have to cross them to do any damage. Light airplanes could drop explosives on them. The problem was easy.

What about the stitching-gun?

Simple. Capture as many as possible from the lop-tails, and teach our men how to use them. Find the factories that made them, and induce the manufacturer to make more. And the same for the place that made their darts. Minor details of the gun's outward appearance could be changed, and a big seal attached, reading "Official *Centra* Stitching-Gun."

Now, the big question: How to end this creeping war?

The Planetary Integratoin staff had a simple answer for that one. Every time a human was killed, ten of the lop-tails should lose their lives. If that didn't stop the foolishness, then *eleven* lop-tails should die. If it still went on, then *twelve* lop-tails. Each time the ratio was raised there should be an impressive announcement. Placards should be scattered over the country, saying, "If you murder a Centran, you kill *ten* of your own kind."

The lop-tails should be offered full humanoid equality, local self-government, and all the other inducements, on the condition that they were peaceful, and disciplined the rowdy elements that were causing trouble.

Horsip gave the necessary commands to set the machinery in motion.

For a full week, everything worked splendidly.

Horsip was enjoying a hot scented bath when Moffis came charging in. Moffis had a raised black-and-blue welt on his head, his uniform was torn open at the chest, and he looked furious.

Horsip put his hands over his ears.

"Stop that foul-mouthed cursing," said Horsip. "I can't understand a word you're saying."

Moffis shivered all over convulsively.

"I say, your integration program isn't working, that's what I say!"

"Why not?" Horsip looked stunned.

"How do I know why not? Nothing works on this stinking planet!"

Horsip clambered out of the tub into the drip pan. "What's wrong? What's happened?"

"I'll tell you what's wrong! We built the small forts and splat-gun nests just as you told us to. The crews in them have been living a horrible life. They're harassed from morning to night. And just what is the advantage, I'd like to know, of having five hundred men strung out in two dozen little packets that

have to be supplied separately, instead of all together where you can do something with them?

"And then, this stitching-gun business. We can't *find* the manufacturer. Everyone says someone else made it. Or they say they used to make them, but not that model. Or they haven't made them for years. Or we blew up their factory when we attacked. And—hairy master of sin!—by the time we get through going from one place to the other—they talk a different language in each place, you know—we don't know whether we're standing on our hands or our feet. Let me give you an example.

"We took this stitching-gun we captured around to find out who made it. Wouldn't you think they could just look at it and tell us? No, sir! Not them! We showed it to the Mairicuns first. One of them said it didn't look like one of their jobs. He thought the Rushuns made it. The Rushuns said it wasn't one of theirs. Theirs had wheels on them. Try the Beljuns. The Beljuns said they didn't make it. Maybe the Frentsh did. The Frentsh looked it over and said, Oh, no, that was a Nazy job. And where were the Nazies? They were wiped out years ago."

Moffis stared at Horsip in frustration. "Now what do we do? And listen, I'm just giving you a summary of this. You don't know what we went through. Each one of those places has bureaus, and branches, and departments, and nobody trusts anyone else.

"The Rushuns say about the Mairicuns, 'What can you expect of those people? Pay no attention to them.'

"The Mairicuns say about the Rushuns, 'Oh, well, that's just what the Rushuns say. You can't believe that.'

"Now what do we do?"

Horsip decided he had dripped long enough, wrapped a bath-blanket around him and began drying himself. Evading the issue, he asked, "How's the casualty rate?"

"We haven't had a man *killed* since we made the edict."

"Well," said Horsip, brightening, "that worked out, didn't it?"

Moffis looked like he smelled something unpleasant. "I don't know."

"Well, man, why not? What's wrong with that? That's what you wanted, isn't it?"

"Well . . . I guess so."

"Well, then. We're getting a grip on the thing."

"Are we?" Moffis pulled a sheet of paper out of his pocket. "Since we gave the edict, we have had three thousand seven hundred sixty-eight slit or punctured tires, one hundred twelve blown-up places in the road, five unoccupied cars rolled over the side of a hill, eighteen cars stuck in tarry gunk on a steep incline, and a whole procession of twenty-six cars that went off the road for no known reason at the bottom of a hilly curve. We have also had break-downs due

to sand in the fuel tank, water in the fuel tank, holes in the fuel tank, and vital parts missing from the machinery. Is that an improvement or isn't it? The tires, injured roads, and damaged machinery have to be repaired. That takes work. In this same period we have had"—he turned over the paper—"one hundred twelve men out for sprained backs, ruptures, and so on, and eight men in bad shape due to heart trouble. Also, the men are getting rebellious. You know as well as I do, Centra soldiers *hate* drudgery. Not only that, but you should see those roads! How do they make them like that in the first place? We *can't* repair them as well as they're made. I tell you I'm getting fed up with this!"

Horsip scrubbed himself dry, then dressed and went off to see his Planetary Integration staff, now working happily on plans for final integration of the planet into the Integral Union some twenty years in the future. Moffis went along with him. Horsip explained the situation.

A precocious-looking individual with large eye-correctors and thin hair on his hands, addressed Moffis in a peevish voice.

"Why," he demanded, "do you fail to assure proper protective precautions for these vehicles?"

"Because," snarled Moffis, "we have all these stinking rattraps to supply, that's why."

"I presume your troops are in possession of all their senses? How can damage be inflicted upon the vehicles when your men maintain proper precautions?"

"What? I just told you!"

"I fail to understand how it can be possible for the natives to approach the vehicles without being apprehended."

Horsip put in quickly, "He means, why aren't they seen?"

Moffis, whose face was glowing red, said fiercely, "Because it's night, that's why! They can't be seen!"

"A simple solution. Carry the operation out in daytime."

Moffis gritted his teeth. "We *can't*. Every time a car slows down in the daytime, some sharp-shooter half-a-drag away puts a dart through the tires."

Moffis' precocious-looking questioner stared at him as if in a daze. "Oh," he said, suddenly looking relieved, "exaggeration-for-conversational-effect."

"What?" demanded Moffis.

"I supposed you to be serious about the half-drag accuracy of the projectile."

"About," Horsip hastily interpreted, "how far the native's gun could shoot with accuracy. He thought you meant it."

"I did mean it," said Moffis.

There was a sound of uneasy movement in the room.

"Theoretically impossible," said someone.

Moffis glared at him. "Would you care to come up and lie down behind a tire?"

Horsip, noting an undesirable effect on the morale of his staff,

suggested they put a team to work on the new problem, while the rest continue what they were doing. He ushered the growling Moffis out of the room.

By the time Horsip had Moffis soothed down, and finally got back to his staff, an uproar had developed over the "meaning" of the "significant datum" that the lop-tails could shoot a gun half-a-drag and hit something with it. This fact seemed to upset a great number of calculations, in the same way that it would upset calculations to find two different lower jaws for the same prehistoric monster.

The arguments were many and fierce, but under Horsip's skillful prompting, they seemed to boil down to a choice between two, either: (a) the lop-tails possessed supernatural powers; or (b) the lop-tails used methods of precision manufacture on their ordinary guns and munitions such as humans used only—and then with great difficulty—on their spaceships.

The possibilities resulting from the acceptance of (a) were too discouraging to think about. Those resulting from (b) led by various routes each time to the same conclusion, that the lop-tails were smarter than the humans.

This unpleasant conclusion led to one that was really ugly, namely, of two races having humanlike characteristics, which race is human, the smart race or the dull race?

At this point in the argument, an unpleasant little man in the back of the room rose up and announced that on the basis of an extension of standard comparative physique types from the humanoid to the human, the lop-tails were more advanced than the Centrans.

But that was the low point in the argument. Soon the hypothesis of "pseudo-intelligence" was introduced to explain the lop-tails accomplishments. Next, a previously undistinguished staff-member introduced the homely simile of passing over the brow of a hill. If, he said, one went far enough in one direction, he at last came to the very top of the hill. Any further motion in that direction carried one down the slope. True, he said, these lop-tails might go further in certain physical characteristics than the Centrans themselves. But to what point? The Centrans were at the peak, and any ostentatious exaggeration of Centran traits was merely ridiculous.

The excitement abated somewhat, and Horsip got his staff back to work on the pressing problem of supplying the road outposts without losing vehicles in the process. Then he hunted up Moffis.

The Military Overseer was in a room with five humans and a number of lop-tails. Plainly, Moffis was trying to question the lop-tails about something. But the lop-tails were arguing among themselves. Moffis left the room when he saw Horsip, first instructing his subordinates to carry on.

Moffis, wincing as if with a severe

headache, said: "What a relief! I'm glad you came along."

"What's wrong?" asked Horsip.

"Interpreters," said Moffis. "These lop-tails all have different languages, and interpreters never agree on what is being said."

"Hah!" said Horsip. "You should have heard what I've just been through."

"This was worse," said Moffis.

"I doubt it," said Horsip, and described it.

Moffis looked gloomy. "I don't care what you call it. This pseudo-intelligence is going to be the end of us yet. Of all the planets I've helped capture or occupy up till now, I've generally had the feeling of outplaying the natives. You know what I mean. After the first clash of arms, you play a *deeper* game than they do. You manipulate the situation so that if they go against you they're swimming against the current. When you have that advantage, you can use it to get other advantages, till finally, you have complete control of the situation."

"They're integrated," said Horsip.

"Yes," said Moffis. "But it isn't working that way here. Ever since the initial clash, we've been *losing* advantages. We're spread thin. The natives act in such a way that we spread ourselves thinner. I have the feeling *we're* the ones that are swimming upstream."

"Still," said Horsip, "we're the conquerors."

"I just hope they stay conquered," said Moffis fervently.

"I have an idea," said Horsip.

Horsip and Moffis spent the next few hours discussing Horsip's idea.

"It's the best thing yet," said Moffis, as they strolled down the hall afterward. A smile of anticipation lighted his face. "It should tie them in knots."

Horsip smiled modestly.

"We'll need plenty of reinforcements," said Moffis, "so I'll send out the request right away."

"Good idea," said Horsip.

They strolled past the office of the Planetary Integration staff. A sound of groaning came from within. Horsip spun around.

"Excuse me," said Horsip. Scowling, he went into the room.

As he entered, he saw the whole staff sitting around in attitudes of gloom and dejection. A number of natives were in the room and one was talking earnestly to several members of the staff.

"No! No! No!" the native was saying. "You can't do it that way! If you do, the cars will lurch or even fly off the track every time you get up past a certain speed. You've got to have a transition curve first, see, and then the arc of a circle."

Horsip stopped, puzzled, and looked around.

Beside him, a staff member with his head in his hands looked up and saw Horsip. Horsip glanced at him and demanded, "What's going on here?"

"We got the natives in to study their language, and . . . and to worm

their tribal taboos out of them." His face twisted in pain. "And we wanted to find out the limits of their pseudo-intelligence." Tears appeared in his eyes. "Oh, why did we do it?"

"Will you stop croaking?" snapped Horsip. "What happened? What is all this about?"

"They're *smarter* than we are!" cried the staff member. "We tested them. And they're smarter. Oh, God!" He put his head in his hands and started to sob. Several other staff members around the room were crying.

Horsip let out a low growl, stuck his head into the corridor, and bellowed, "Guards!"

A sergeant came running, followed by a number of soldiers.

"Clear these natives out of here!" roared Horsip. "And hold them under guard till I give the word!"

The sergeant snapped "Yes, sir!" and began to bawl orders.

The natives marched past with knives and guns in their backs.

"Listen," said one of the natives conversationally, as he was hustled out of the room, "if you'd just put holes in the guards of those knives, you could slip them over the gun barrels, and it would make it twice as easy—" His voice faded away in the corridor.

Horsip, furious, turned to glare at his staff. With the natives' voices taken out of the room, the sobbing and whimpering was now plainly audible.

"Stop that!" roared Horsip.

"We can't help it," sobbed several voices in unison, "they're smarter than we are."

"Gr'r'r'." said Horsip, his face contorted. He reached out, grabbed one man by the uniform top, and slapped him hard across the face. The man stiffened, his eyes flashing reflexive rage.

"Listen to me!" roared Horsip. "You limp-spined, knock-kneed boobs! Pay attention here, before I—"

Slap!

"Look up, you slack-jawed—"

Slap!

"Straighten up, before I—"

Slap!

"Look up, you—"

Slap! . . . Slap! . . . Slap! . . .

Massaging his fingers, Horsip returned to the head of the silent room.

"Morons," he said angrily, "you boobs, you simpletons, you subhuman—"

"That's just it!" cried one of the men. "The things you just said are—"

"Shut up!" Horsip glared at him, then let his glare roam over each of the others in turn.

"Here you sit," he went on, "the elect of Centra. Not the smartest, by a long shot, but good enough to be in Planetary Integration. And you moan because the lop-tails are smarter. Do you make your own minds stronger by putting your heads in your hands and groaning about it? Do you make a muscle stronger by complaining that it's weak? Do you climb a hill by lying down, putting

your hands over your eyes, and rolling to the bottom—all because someone else seemed to be a little higher up? Do you?"

There was a feeble scattering of "No's."

"'No'!" said Horsip. "That's right. Now you're starting to think. If you want to be stronger, you use your muscles, so if you want to strengthen your grip, do you let things go loose and sloppy through your fingers? No! You grip down tight on something suited for the purpose. And if you want your mind to grip stronger, do you let it stay limp and loose with self-pity? Do you? *No!* You grip with it! You take hold of something small enough to work with and grip it, fasten your attention on it, and then you've exercised your mind and you're stronger. Right?

"Now," he turned to the nearest man, "fasten your mind on what you've learned from these natives. Hold it steady and think on it. Nothing else. The rest of you, do the same. What an opportunity for you! Then, when you've squeezed all the juice out of what you've learned, boil it down, and put the essence of it on a sheet of paper so I can look it over. Now I am going to be busy, so get to work."

Horsip stalked out of the room, closed the door firmly, strode down the hall to his suite, and locked the door behind him.

"My God," he groaned. "They *are* smarter than we are!"

He stripped off his wet clothes, soaked himself in a steaming hot bath, fell into his bed in a state of exhaustion, and slept sixteen hours without a break.

He awoke feeling refreshed, till he thought of what had happened the day before. With a groan, he got up, and some time later appeared in the Planetary Integration offices, smiling confidently. A stack of papers twice as thick as his hand was waiting for him on his desk. He greeted his staff cheerfully, noted that if they were not exuberant, at least they were not sunk in despair, then picked up the stack of papers and strode out.

Back in his private suite, he plopped the papers down, looked at them uneasily, chose a comfortable seat, loosened the collar of his uniform, got up, checked the door, sat down, and began going through the papers, peeping cautiously at the titles of each report before looking further. Clearly, the natives had unburdened themselves of a vast amount of information. But most of it was very specialized. About a quarter of the way down the list, Horsip came on a thick report labeled: "Love Habits of the Lop-Tail Natives." Firmly he passed over the paper, moved on and found one headed, "Why The Lop-Tails Do Not Have Space Travel." He separated this from the rest, put one labeled "The Mikeril Peril" with it, set it aside, and went on.

When he was through, he had a much smaller pile of papers that he

thought worth reading, the lot headed by a paper on "Topics the Lop-Tail Humanoids Avoided Discussing." Before starting to read them, he thought he would just glance through the pile to see that he hadn't missed any. About a quarter of the way through the heap, he came on a thick paper labeled: "Love Habits of the Lop-Tail Natives." Hm-m-m, he thought, there might be important information in that. You never knew— Firmly, he passed over it and searched through the remaining sheets. He set the pile aside, it slipped off the table, and as he bent to pick it up, he came across "Love Habits of the Lop-Tail Natives."

He decided to just glance at the first page.

Fifty-one minutes later, Moffis rudely interrupted Horsip's wide-eyed scrutiny of page eighteen by hammering on the door.

"Now what?" demanded Horsip, opening the door.

Moffis strode in angrily, a large piece of message paper fluttering in his hand.

"The double-damned boob won't reinforce us, that's what! Look at this!" Moffis thrust out the paper.

Horsip read through the usual dates and identification numbers, passed through some double-talk that all boiled down to "I've thought it over," and then came on the sentence: "Requests for such massive reinforcements at this date would create a most unfavorable atmosphere, and in so far as the Sector Conference on Allocation of Supplies is about to begin, it seems highly inadvisable at this end to produce a general impression of disappointment and/or dissatisfaction concerning the performance of any units of this command."

Horsip's teeth bared involuntarily. He took a deep breath and read on. There were vague hints of promotion if all went well, and subtle insinuations that people would be jammed head first into nuclear furnaces if things went wrong. It ended up with double talk designed to create a sensation of mutual good feeling.

Moffis glared. "Now what do we do?"

Horsip controlled his surging emotions, and took time to think it over. Then he said, "There's a time to smile all over and be as slippery as a snake in a swamp, and then there's a time to roar and pound on tables. Go find out when this Sector Conference meets, and where."

Moffis hurried out of the room.

Horsip went into his office, yanked down a book on protocol, and began drafting a message.

Moffis found him some time later and came in. "I've got the location and time."

"All right," said Horsip, "then send this." He handed over a sheet of paper. "If possible, it ought to be timed so it will arrive just as the conference opens."

Moffis looked at it and turned pale. He read aloud:

"Situation here unprecedented. Require immediate reinforcement by

two full expeditionary forces to gain effective control of situation, which has exceeded in violence and danger that of *Centralis II*."

Moffis swallowed hard. "Do I sign that or do you?"

Horsip glared at him. "I'm signing it. And it would be much more effective if you signed it, too."

"All right," said Moffis. He smiled grimly and went out of the room.

Horsip shivered, went back to his suite, wrapped himself up in a blanket, and began reading "Topics the Lop-Tail Humanoids Avoided Discussing."

Horsip was very thoughtful after reading that paper. Apparently the humanoids were slippery as eels regarding any discussion of military principles or problems. They professed also a great ignorance concerning questions on nuclear fission. They were evasive concerning a glaring discrepancy between the numbers of cannon, traveling forts, et cetera, turned over to the Centrans, and the number that were estimated to have been used in action. Horsip made brief notes on a pad of paper, and turned without pleasure to the next report.

This was a paper headed "The Mikeril Peril." As usual, he felt the hair on the back of his neck rise at mention of the word "Mikeril." Uneasy tingling sensations went up and down his back, probably dating from the childhood days when his mother warned him, "Klide, do you know what happens to bad boys who don't do what they're told? The Mikerils get them." The Mikerils ate Centrans. Or, at least, they *had* before the humans wiped them out in a series of wars. Horsip pulled the blanket around him and began reading the paper.

"I was discussing problems in statistics with one of the lop-tails," the paper began, "and searching a test problem to put to him, I came across some old data concerning the numerous outbreaks of Mikerils on Centra and other planets we have occupied.

"On the basis of the partial data I gave him, the native was able to accurately date other outbreaks that preceded and followed the period concerning which I had given him information. I was preparing to concede the correctness of his calculations, when he screwed up his face, put his head on one side, and said, 'I should estimate the next probable heavy outbreak to take place 67 days, 4 hours and 13 minutes from now, plus or minus 7.2 minutes.' "

Horsip looked up, the hair on his back rose, and he experienced a severe chill as he seemed to see a big hairy Mikeril sinking its poison-shafts into its victim, its many legs spinning him round and round as it bound him helplessly and carried him off inert.

Then Horsip sank down in his seat, looked over the prediction again, and his eye caught on " 'plus or minus 7.2 minutes.' " Horsip decided the native was either vastly overenthusiastic, or else just liked to poke people in the ribs to see them jump. He turned to the next paper.

This one, on "Why the Lop-Tails Do Not Have Space Travel," made difficult reading. Horsip could not reconcile the straightforward title with the involved argument and minute dividing of hairs in the body of the paper. After a hard fight, Horsip got to the last paragraph of the report, which read:

"Summary: In summary, this author states the conclusion that the beings provisionally known as 'lop-tailed humanoids' failed to acquire space-traversing mechanisms owing to a regrettable preoccupation with secondary matters pertaining principally to interests other than those regarding the traverse of interplanetary and interstellar regions, primarily; and secondarily, owing to use of that characteristic provisionally known as 'pseudointelligence,' the aforesaid beings were enabled to produce locally satisfactory working solutions to certain difficult and specialized problems the solution of which, in a different state of affairs, might well have eventuated in the discovery of the principle known

briefly in common professional parlance as the positive null-void (PNV) law. With these conclusions, the native known as Q throughout this paper was in complete accord."

Horsip, dazed from the rough treatment the paper had given him, stared at it in vague alarm. Unable to pin down the exact point that bothered him, he moved on fuzzy-brained to the next report.

This one started off as if it consisted of vital information about the very core of lop-tail psychology. But on close inspection, it turned out to contain a collection of native fairy tales. Horsip read dully about "Pandora's Box, the highly-significant, crystallized expression of the fear-of-the-unknown syndrome, the reaction of retreat-into-the-womb; the tale symbolizes the natives' attitude toward life and their world. The protagonist, Pandora receives a box, (significance of angular shape of typical native container) which she is not supposed to open (see taboo list, below), and a variety of afflictions emerge *into* the world (Pandora's world)—"

Horsip looked up angrily to hear a knock sound on the door. He let Moffis in.

"I sent it off," said Moffis.

"What?" snapped Horsip.

"The message to the Sector Conference, of course." He looked sharply at Horsip. "What hit you?"

"Oh, these stinking reports," said Horsip angrily. "Come in and lock the door."

Horsip went back to the reports and told Moffis about them.

"Some are good, and some are bad," said Horsip, "and some are written so you need a translator to explain them to you. It's always been like that, but on this planet, it seems exaggerated. I suppose for the same reason that a ground-car makes more trouble in rough country."

"Well," said Moffis, "maybe I can help you. Let me look over that bunch you've finished. That business about the significant quantities of guns, et cetera, that are missing, makes me uneasy."

"Help yourself," said Horsip.

Moffis picked up the pile and leafed through it. He paused at one report, looked at it, started to pull it out, put it back, scowled, looked at it again, shrugged, pulled it out further, held his place in the pile with one hand, and pulled it out all the way to look at it.

Together they read the reports, Horsip uttering groans and curses, and Moffis saying "Hm-m-m," from time-to-time.

At last, Horsip threw down several reports with a loud *whack*, and turned to speak to Moffis.

Moffis was absorbed.

Horsip looked impressed, turned away considerately, stiffened suddenly, turned back, got down on his hands and knees, twisted his head around and looked up from below at the title of what Moffis was reading. The letters stared down at him:

"Love Habits of the Lop-Tail Natives."

Horsip untwisted himself, stood up, brushed himself off, and disgustedly left the room. He strode down the corridor, resolved on action. He was fed up with this feeling of struggling uphill through a river of glue. He was in charge of this planet and he aimed to make his influence felt. The first thing obviously was to take these natives the staff had been questioning, get one of them alone with some guards, then put the questions to him. This business of getting it second or third hand was no good.

He turned a corner, strode to a door marked "Prison," said "At ease," as the guard snapped to attention, and started in.

"Sir," said the guard desperately, "I wouldn't go in there just now. Things are a little confused right now, sir."

Horsip's brows came together and he strode through the doorway as if propelled by rockets. He halted with equal suddenness on the other side.

Several dazed-looking soldiers were working under the direction of a red-faced officer who was barking oaths and orders in rapid succession. The general direction of the effort seemed to be to get three soldiers who were tied up untied. The trouble was that the three were off the floor, strung by their middles to the upper tier of bars in a cell. When one soldier was successfully pulled to the floor, overenthusiastic soldiers working on the other side of the bars would make a leap upward, seize one of the other soldiers, and haul him down, whereupon the first soldier would fly up out of the hands of the men trying to untie him.

"Captain," said Horsip dryly, "concentrate your effort on one man at a time."

The officer was apparently shouting too loudly to hear.

Wham! Down came one soldier and up went another.

The officer paid not the slightest attention to Horsip's order.

Horsip noticed one of the three tied soldiers slowly bending and unbending from his middle.

The first soldier came down and the second jerked up.

The officer screamed in frustration, threats, oaths, and orders mingled together in a rage that drove the soldiers to jerking frenzy.

Down came the second soldier. Up went the first.

Now the first was down again. Now he was up. Now down again.

Up . . . Down . . . Up . . .

Every small detail of the scene was suddenly crystal clear to Horsip, as if he were seeing it under thick glass. He felt detached from it all, much like a third person looking on. When he spoke, he did not feel that he gave excessive force to the word. He was hardly conscious of speaking at all. He merely said:

"CAPTAIN!"

The officer halted in mid-curse. He turned around with the glassy-

eyed expression of a fish yanked out of the water on a hook.

The soldiers froze in various postures, then jerked to attention.

The outer door opened up and the guard presented arms.

Horsip said, "Captain, take the two nearest soldiers. Have them pull down that man on the *outside* of the cell. Now have them hold tight to the rope that's looped up over the bar. Now, take the next two nearest soldiers and have them untie that man. All right. Now, have those next two soldiers stand on the opposite side of those bars, *inside* the cell, ready to catch that other soldier when the rope is lowered."

The captain, using his hands to move the soldiers around, was following out Horsip's orders in a sort of dumb stupor. The first soldier was untied. The second soldier was cut down. The second soldier was untied. The third soldier was untied, and sat chafing his wrists and hands, and massaging his abdomen.

Horsip motioned the captain into a little cubicle containing a desk and a filing cabinet.

"What's happened here?" said Horsip.

The captain merely blinked.

Horsip tried again. The captain stood there with an unfocused look.

"Report your presence," said Horsip.

The captain's hand came up in a salute, which Horsip returned.

"Sir, Captain Moklis Mogron, 14-0-17682355, 3rd Headquarters Guards, reports his presence."

The captain blinked, and his eyes came to a focus. He seemed to really see Horsip for the first time. He turned pale.

"What happened, Captain?" said Horsip.

"Sir, I—" The captain stopped.

"Just tell me what you saw and heard, as it happened," said Horsip.

"Well, I . . . sir, it all boils down to . . . I just don't remember."

"What's the first thing you do remember?"

"I opened that outside door, and I came in, and— Wait. No. The guard came to me and told me the prisoners needed attention. I came in, and . . . and—" He scowled fiercely. "Let's see, I came in, and, let's see, one of the prisoners—yes! The prisoners were out of their cells! . . . But they said that's what they called me in for. The lock design on the cell was no good, and they wanted to show me a better one. One of them was holding a shiny key on a string in the bright light from this desk light . . . now, what was that doing out there? . . . and he said to look at it, and watch it, and keep my eye on it, and he'd explain why I should . . . should—"

The captain looked dazed.

"Report your presence!" snapped Horsip.

The captain did so. Horsip tried several times, but could not get past the point where the natives showed the captain the shiny key in the bright light. Horsip became vaguely aware that he was wasting his time on scattered details, and, as usual

on this planet, coming away empty-handed. He sent the captain out to learn from the three soldiers how they had come to be tied up in the air that way. The captain returned to say the natives had told the soldiers about a rope trick, had gotten them over to the bars with a coil of rope, and that was all the soldiers remembered.

Horsip sent out orders to comb the place for the prisoners, and for anyone who had seen them pass to report it.

The prisoners weren't found, and everyone was sure *he* hadn't seen them.

Horsip went back to his rooms feeling more than ever as if he were struggling uphill through layers of mud.

The next day passed in a welter of sticky details. The staff had finally figured out how to get supplies to the outposts without having the tires shot out in the process. An armored ground-car towing a string of supply wagons was to approach the outposts, traveling along the roadway at high speed. As the cars passed the outposts, soldiers on the wagons were to throw off the necessary supplies, which the men from the outposts could come out and pick up. In this way, the staff exulted, there would be no need for the cars to slow down; as the natives seemed reluctant to fire at moving vehicles—lest they kill someone and invoke the edict—there should be no more trouble from that source.

To protect vehicles from sabotage at night, the staff proposed the construction of several enormous car-parks, to be surrounded by leaping-mine fields and thick spike-bar barriers.

Meanwhile, another convoy of eighteen cars had shot off the bottom of the hilly curve with no known explanation. The staff advised the building of a fortified observation-post, with no fewer than two observers on watch at all times, so it could at least be found out what happened.

But the old troubles were not the only ones to deal with. Just as the Planetary Integration team triumphantly handed out answers to thorny problems that had confounded them in the past, word came of something new and worse. The soldiers were getting hard to manage.

Always in the past, on conquered planets, the troops had had *some* sort of female companionship. The natives had often been actually glad to make alliances with their conquerors. But here, such was not the case. The females of the local species ran shrieking at the approach of a love-starved soldier. This had a bad effect on morale. Worse yet, the lop-tail authorities had been offering to help matters by showing the soldiers instructive moving pictures on the topic, these pictures being the very same ones used to instruct the lop-tail soldiers on how to act toward females. Since seeing these pictures, it was a question who was more afraid of whom, the soldiers

or the women. Now there was a sort of boiling resentment and frustration, and there was no telling where it might lead to.

While the staff, under Horsip's direction, was thrashing this problem out, Moffis, red-faced and indignant, came charging into the room.

Horsip sprang from his seat and rushed Moffis out into another room.

"Hairy master of sin!" roared Moffis. "Are you trying to ruin me?"

"Keep your voice down," said Horsip. "What's wrong now?"

"Wrong? That stinking idea for feeding the outposts, that's what's wrong."

"But— Why?"

"Why?" Moffis growled deep in his throat. He stepped back, his teeth bared and one hand out to his side. "All right. Here I am. I'm on one of these stinking supply-wagons your bright boys say ought to be hooked up to the ground-cars. We're racing along the road at high speed, like we're supposed to. We go over a repaired place in the road. All the wagons go up in the air. I have to hang on for dear life or *I* go up in the air. Now someone yells 'Three barrels of flour, a sack of mash, three large cans Concentrate B, and a case of .33 splat-gun darts.' "

Moffis glared. "I'm supposed to get this stuff unstrapped and pitched out between the time we bounce over the repaired place and the time the outpost shoots past to one side?"

Horsip hesitated.

"Come on," roared Moffis. "*Am* I?"

"Well, now, look," said Horsip. "You're not going at it the right way."

"Oh, I'm not, am I?"

Horsip flared: "If you had the sense an officer's supposed to have, you'd know better than to have the stuff strapped in helter-skelter. You'd have a supply schedule strapped to a wagon post, and the supplies all loaded on in reverse order, so it would be no trouble at all—"

"But," said Moffis, "I'm not playing the *part* of an officer here! I'm one of our *soldiers!* I'm irked and griped because here I am, a soldier of the Integral Union, and I don't even dare speak to any of the native girls running around. There's no fighting going on—nothing definite —just an endless folderol that isn't getting anywhere. I'm about fed up with the thing. Every time I turn around there's some new makeshift."

"Yes, yes," said Horsip. "I see that—"

"All right," said Moffis, "the point is, the soldier is no mathematician in the first place. If you explain every point of the routine to him—O.K., *maybe*. But if he isn't used to it, things are going to get snarled up. Well, he hasn't had any training for this routine and it's a mess."

"In time—" said Horsip, groping his way.

"In time, nothing," said Moffis. "It won't work, and that's that. I haven't even had time to tell you everything wrong with it. What do you suppose these barrels and cans

do when they hit the ground, anyway?"

"Well—"

"They *burst,* that's what they do! And I'm here to tell you a soldier that sees his barrel of flour come out the side of a wagon, hit the ground, fly to pieces, and then get swirled all over the road by half-a-dozen sets of wheels is in no frame of mind worth talking about."

"For—"

"He has to sweep it up with a broom!" roared Moffis. "And by the Great Hungry Mikeril, I tell you, *I* don't want to be around trying to give that soldier orders until we've unloaded his gun and got his knife away from him. There's got to be some other way of supplying these outposts or I pull in every one of them and to hell with sharpshooters along the road. At least the men will be able to eat."

"Yes," said Horsip, feeling exhausted, "I see you've got a point there."

"All right," said Moffis. He stopped to swallow and massage his throat. "There's another thing. This car-park idea."

"Surely there's nothing wrong with that."

"No, the *idea* is all right. The plan on paper looks good. But how many million gross of spike-bars do your people think an army is equipped with, anyway? You're an officer. You know that. We have just so many for ordinary requirements, plus a reserve for desperate situations. And that's it. Well, this planet has been nothing but one big desperate situation since we landed on it. We just don't have the material to make any such big things as these car-parks."

"Couldn't you," said Horsip, desperately, "collect a few here-and-there from your fortifica—"

"No!" roared Moffis, his voice cracking. "Not on your life! Once we start gnawing holes in our own defenses—"

"All right, then," said Horsip, straightening up, "what about the natives? They had armies. *They* must have used spike-bars. Or, if they didn't, we can teach them how they're made, buy them from them—"

Moffis looked down at the floor gloomily.

"What's the matter?" said Horsip.

Moffis shook his head. "They didn't use spike-bars."

"Well, then, we can teach—"

"They had their own stuff."

Horsip looked apprehensive. "What?"

"Fang-wire."

Horsip felt himself sinking into a fog of confusion. With an effort he struggled clear. "What did you say?"

"I said, they had their own stuff. Fang-wire."

"What in the world is that?"

"Thick twisted wire with teeth on it."

Horsip goggled. "Is it as good as our spike-bars?"

"As far as coming up against it,

one is about as bad as the other."

"Then— Why don't we use it?"

Moffis shook his head. "If you ever saw our soldiers laying the stuff out— It comes wound up on little wire barrels. You have to take one end of the stuff, without getting the teeth in you, and pull it free. It comes off twisted, it jumps and vibrates, and the teeth are likely to get you if you try to straighten it out. I saw half a company of soldiers fighting three rolls of fang-wire the only time we ever tried to use it. The wire was winning. The natives *were* dug in on a hill opposite from us, and they were having hysterics. No, thanks. Never again."

"Listen," said Horsip doggedly, "if *they* use the stuff, there must be some way to do it."

"That's so," said Moffis, "but if we take the time to train the army all over again in new ways of fighting, we aren't going to get anything else done."

Horsip paced the floor. "I hate to say this, Moffis, but it appears to me to be a plain fact that this victory is tearing the army to pieces."

"I know it," said Moffis.

"Everywhere we come in contact with the natives, something goes wrong."

Moffis nodded.

"All right," said Horsip, his voice rising. "What we need here is drastic action, striking at the root of the trouble."

Moffis watched Horsip uneasily. "What, though?"

"Reconcentration," said Horsip. "The iron rusts fast when it's cut in bits where the air can get at it. Melt it back into a bar and only the surface will rust. Then the bar will keep its strength." Horsip looked hard into Moffis' eyes. "We've got to mass the troops—not just the road outposts, but the occupation districts. Everything. Take over a dominating section of this planet and *command* it."

"But regulations— In Phase II we *have* to do it this way!"

"All right," said Horsip, "then we'll go back to Phase I."

"But . . . but that's never been done! That's—" Moffis paused, frowning. "It might work, at that. The devil with regulations."

They gripped each other's arms. Moffis started for the door and walked into a hurrying messenger. He exchanged salutes, took the paper, looked at it, and handed it to Horsip. Horsip looked at it and read aloud:

"Hold on. Arriving in thirty days. Twenty million troops in motion. Your plan good. Argit, Supreme Integrator."

"I guess we'd better stay put," said Moffis.

Horsip frowned. "Maybe so."

It was a trying thirty days.

The outposts took to buying food direct from the natives. The road-repair crews fell into an ugly habit of getting out of work by exposing arms or legs and daring the lop-tails to shoot at them. There were so many flesh-wounds that the aid

stations began running out of supplies. Troops in the remoter sections began drinking a kind of liquid propellant the lop-tails sold in bottles and cans. It was supposed to cure boredom, but the troops went wild on it, and the reserves were kept bouncing and grinding from one place to another, thinking the war had broken out again.

Planetary Integration did have a few victories to its credit. The trouble on the hilly curve, for instance, proved to be caused by a gang of native boys who came out every few days and stretched a cable across the road at an angle. The speeding ground-cars spun around the curve, slid along the cable and went over the edge. The boys then came out, rolled up the cable, and went home for breakfast. By the time this was discovered, the situation was so uneasy no one thought of asking any more than that the boys be spanked and the cable confiscated.

At intervals, by now, large concentrations of humanoid soldiers were observed in open maneuvers; their troops were fully equipped with stitching-guns, cannons run from place to place by their own engines, and traveling forts in numbers sufficient to turn a man pale at the mere mention.

Horsip watched one of these maneuvers through a double telescope in an observation post on his fortified mountain.

"Is that what you had to fight, Moffis?" he asked, his voice awed.

"That's it," said Moffis. "Only more of them."

Horsip watched the procession of forts, guns, and troops roll past in the distance.

"Their airplanes," said Moffis, "were worse yet."

"Then how did you ever win?"

"For one thing," said Moffis, "they weren't expecting it. For another, they wasted energy fighting each other. And our troops were in good order then. They were used to victory, and they were convinced they were superior. Then, too, we used the Fleet to cut the natives' communications lines."

Horsip looked through the telescopes for a while, then straightened up decisively.

"Well, Moffis," he said, "we're in a mess. We're like a man in an ice-block house when the spring thaw sets in. We don't dare step down hard anywhere lest the whole thing fall apart. We've got to walk easy, and just hope the cold wind gets here before it's too late. But there *is* one thing we ought to do."

"What's that?" said Moffis.

"The reserves. They aren't committed anywhere. We've got to hold them in hand. And if we need them, we want them to be a club, not a length of rotten wood. We've got to train them so hard they don't have any time to get flabby."

"Truth," said Moffis. "There are so many leaks to patch, one forgets other things."

The occupation army got through twenty-four of the thirty days like a ship sinking slowly on a perfectly even keel.

On the twenty-fifth day, however, a procession of native military might passed by Horsip's mountain headquarters in such strength that the ground was felt to tremble steadily for three hours and a half.

On the twenty-sixth day, a native delegation called on Horsip and politely but very firmly pointed out to him that this military occupation was disrupting business, and was causing all manner of trouble to everyone concerned; it should, therefore, end. Horsip was very agreeable.

On the twenty-seventh day, three hundred traveling forts blocked traffic on one of the main highways for more than two hours.

On the twenty-eight day, a flying bomb came down a mile-and-a-half from headquarters, and left a hole big enough to hide a rocket fleet in. The ground shuddered and quaked with marching feet. That evening, the native delegation called again on Horsip and stated their position in short pithy sentences, and words of few syllables. Horsip pleaded that he was tied up in red tape. The natives suggested the best way to get rid of red tape was to cut it with a knife.

In the early morning of the twenty-ninth day, a flight of Centran airplanes, trying to scout the strength and direction of the native movements, was forced down by humanoid aircraft, that flew at and around

them as if they were standing still. Horsip ordered the rest of his airplanes grounded and kept hidden till he gave the word. The observers of the planes forced down straggled in to report massive enemy concentrations flowing along the roads past the small forts and splat-gun nests as if they did not exist. The troops in the forts and nests were apparently afraid to fire for fear of being obliterated.

Horsip received the reports while Moffis carried out a last minute inspection of the fortifications at and around headquarters. Late that morning, a hot meal was given to all the troops.

At noon, a traveling fort of a size suitable to have trees planted on it and take its place among the foothills was seen approaching headquarters. It moved into range, came up close, and swung its huge gun to aim directly at the concrete doorway heading down into the mountain. Horsip ordered his gunners not to fire, his unexpressed reason being that he was afraid it would have no effect. He then bade Moffis a private farewell, walked out the concrete doorway in full regalia, glanced at the huge fort, laughed, and remarked to a white-faced man at a splat-gun that this would be something to tell his children. He carried out a calm, careful inspection of the fortifications, reprimanding one gunner mildly for flecks of dirt in a gun barrel. He glanced confidently up the mountainside where ranks of cannon-snouts centered on the huge fort. The gunners around him followed his gaze. Horsip returned the salute of the officer in charge and went back below.

On the plain before the mountain, hundreds of traveling forts were grinding across-country, clouds of dust rising up behind them.

"We should open fire," said Moffis.

"No," said Horsip. "Remember, we're playing for time."

The traveling forts swerved and began approaching. Behind them, the hills were alive with troops and guns.

Horsip gave orders that a huge orange cloth be unrolled on the far side of the mountain. A landing boat circling far above did a series of dips and rolls and rose rapidly out of sight.

The traveling forts came closer.

The monster fort just outside headquarters debouched one native who came in under guard and demanded Horsip's surrender.

Horsip suggested they hold truce talks.

The native returned to his fort.

The troops in the distance began spreading out and crossing the plain.

The huge fort moved its gun a minute fraction of an inch, there was a blinding flash, a whirl of smoke. The tunnel entrance collapsed. There was a deafening clap and a duller *boom*. The ground shook. Tons of dirt slid down over the entrance. There was a fractional instant when the only sound was the last of the dirt sliding down. Then

the earth leaped underfoot as the guns on the mountain opened up.

The traveling forts roared closer, their firing a bright winking of lights at first, the boom and roar coming later. The troops behind followed at a run.

Horsip ordered the planes up, to ignore the forts and attack the troops.

Humanoid planes swooped over a nearby hill.

Life settled into a continuous jar that rattled teeth, dulled thought, and undermined the sense of time. Things began to seem unreal and discontinuous.

Reality passed in streaks and fragments as Horsip ordered the movement of cannon by prepared roadways to replace those put out of action. There was a glaring interval where he seemed to live a whole lifetime while reports came in that enemy troops were swarming up the hillside to silence the guns by hand-to-hand fighting. When the attack slowed he sent a body of reserves to drive the attackers back down and away. But more came on.

The enemy planes began a series of dives, unloosing rockets that bled his troops like long knives stabbed into flesh. Moffis ordered the highest guns to fire on the planes and the rest to carry on as they were. Horsip spent a precious second damning himself for not making that arrangement prior to the battle, and then a yell from the enemy sounded as they surged through the doorway Horsip had thought blocked. He sent a few troops with splat-guns to fire down the corridors, then had to turn his attention to a rush up the reverse side of the hill that had captured a number of the lower gun positions there. He sent in a picked body of the Headquarters Guard he had ordered concealed on the side of the hill for that very purpose.

Evening had at last come, and with it a steady rumbling from the near distance, where the sky was lit with a blue and yellow blaze. Centran ships were pounding the gun positions on the opposite ridge, and their screens were flaring almost continuously with the impact of missiles slammed against them.

The fighting had died out around the mountain, and Horsip and Moffis went out with a small guard to inspect the positions personally. The air was pungent and damp. Their ears felt as if they had layers of cloth over them. There was a thin moon, and here and there on the ground pale glimmerings could be seen as wounded men moved. There was an almost continuous low moan in the air. A soldier with his back against a gun feebly raised a hand as Horsip came near. "The Great One bless you, sir," he said. "We threw 'em back."

Horsip went back to his command post after ordering several guns moved and some spike-bar barriers set up. He felt dazed. He lay down on a cot for a few hours sleep, and was wakened in the early morning to be told an important message had arrived.

On the thirtieth day, five million reinforcements landed.

Horsip spent the day explaining the situation to Drasmon Argit, the Supreme Integrator.

Argit paced the floor, ate meals, lay down on a couch, stretched, pounded out questions, gave orders to hurrying subordinates, and listened, questioned, listened, as Horsip in a desperate urgency to get the situation across, explained and expounded, using charts, maps, diagrams, and photographs. He tried to get across the sensation of struggling uphill through a river of glue, and was gratified to see that Argit seemed to be getting the idea faster than he —Horsip—had.

After the evening meal was eaten and cleared away in the privacy of a small office, Argit got up and said, "All right, I think I see your point. The natives are technologically more advanced than we are. By a freak, they don't have space travel. We beat them for this reason and because we caught them off guard and they attacked each other. There is also the possibility that they are more intelligent than we.

"All these things are possible. In the course of occupying a million worlds—and there must be that many —who could hope we would not find beings more intelligent than we? Yet these intelligent beings had not yet succeeded in integrating their own planet, much less whole star systems, as we have done. On the contrary, they were about ready to blow their own planet apart when we landed. Why was that?

"You know the principle of the nuclear engines. There is a substance Q that flings out little particles. These little particles strike other atoms of Q which fling out more particles. There is also a substance L which absorbs these particles. Success depends on the correct proportioning of Q and L. There must not be too much L or the particles are absorbed before things can get started. There must not be too much Q or the particles build up so fast that suddenly the whole thing flies apart.

"Now, consider these natives. What are they like? An engine with too much Q, is it not? And what are we like? To speak frankly, Horsip, we have a little too much L, don't you think?"

Horsip nodded reluctantly, then said, "I think I see your point all right, but what are the flying particles in this comparison?"

Argit laughed. "Ideas. From what you tell me of these people, they fairly flood each other with ideas. Horsip, you and I and others in our position have had a difficult time. We are like atoms of Q tearing ourselves apart to try and fling enough particles—ideas—through the general mass so the thing won't all grind to a stop. We only half succeed. At intervals these Mikerils come along and hurl us halfway back into barbarism. We should be able to merely raise the speed of reaction a little and burn them back into outer space.

But we haven't been able to. The machine was running as well as it could already— Not enough Q. Horsip, this planet is a veritable mine! There are vast quantities of Q here. It is just what we need!"

Horsip scowled. "Getting it out may be another matter."

Argit nodded. "We only arrived just in time. A little longer and it might all have blown up. We have to fix that first."

"How?"

"Your idea, first. You intended to mix whole populations up, because the language and customs difficulties would cause much confusion and tie them in knots. That is very good. That would act, you see, to slow up the spread of particles—ideas. But we want these people on our side. To that end, we must first help remove their own difficulties, —while serving our own purposes, of course. We couldn't stand too many eruptions like this.

"Horsip, with due consideration for their various levels of civilization, we must transfer groups of young people, and various professional groups, from one region of this planet to others. We will not insist that they mix races or customs; but chemicals react best when divided in small lumps, so—who knows—perhaps it will bring an *end* to some of these enmities.

"Meanwhile, they are bound to pick up our language. And we will pick up such of their technological skills as we can make use of. They need a universal language. We need new discoveries. Both will profit.

"And then we will offer posts of importance, trade agreements, raw materials—"

"How do we know they are going to accept this?" said Horsip, remembering his own eagerness.

"Ha!" said Argit. "You showed me yourself. They are a born race of teachers and talkers. Every time they've been in here, what has it been?—'Let me show you how that should be done.' 'No, look, you have to do it this way.' 'Put a hole in the guard of that knife and you can slip it over the gun barrel.'" Argit laughed. "I will bet you the hairy arm of the first Mikeril that attacks us after we get this settled that half the trouble with these people is, they can't find anybody to listen to them."

Argit opened the door. A number of Centran troops were squatting in a circle outside, where a medical aide was bandaging a wounded native. The native was talking eagerly in the Centran tongue that appeared to seem simple to them, compared to their own languages.

"Now," he was saying, "see here. Put a heavy bolt through this place where these bars come together, and you can vary the focus from here, with one simple motion. See? What's the advantage of having to swing each of these barrels around one at at a time? It takes too long. You waste effort. But from *here*, you just loosen the nut, swing the barrels close, tighten it with the wrench, and

you're all set. It'd be easier to carry, too."

The circle of Centrans looked at the native, looked at each other, and all nodded.

"Truth," said one of them somberly.

Argit closed the door.

"You see?" said Argit. "They're born Q material."

Horsip sadly shook his head. "It seems so. But what are our men? Damper rods."

The sound of tramping feet sounded outside in the corridor as the leading elements of more reinforcements marched past.

"That's all right," said Argit. "*We* need Q material."

The tramping rose to a heavy rumble. Horsip felt reassured and Argit nodded approvingly.

"And more than anything else I can think of," said Argit, speaking over the noise, "these people need damping rods.

"You have to have *both*."

THE END

IN TIMES TO COME

On the cover of next month's issue, you'll see Mr. Lije Baley, Earthman detective, coming out from underground into the light of The Naked Sun. Isaac Asimov's new serial is bringing Elijah Baley and his robot partner, Daneel, on another detecting mission. But while the surface activity is that of determining who killed a man when it was self-evidently impossible, the real and important problem Baley has to solve is far more complex. Essentially, it is . . . "Which Way Is UP? Which way is forward?"

And this time, the problem lies on one of the Outer Planets; agoraphobic Elijah Baley has to solve a problem under the conditions least endurable to him—out under The Naked Sun!

Also coming next issue is a yarn by Randall Garrett and Robert Silverberg called "Sound Decision." Every form of transport Man has ever invented has, at one time or another, gone haywire and smashed itself and/or its passengers. This includes Shank's Mare right through to supersonic jets. Usually, legislation regulating the results can be developed after a few cases have been studied.

The next form of transportation . . . that won't work. Man had best learn to establish the legislation before the first case occurs . . . as Garrett and Silverberg show.

THE EDITOR.

MARGIN OF PROFIT

The essence of good business practices involves careful consideration of the long-term results of a policy. The statistics of the thing may solve the problem of applying the principle of the thing!

BY POUL ANDERSON

Illustrated by Freas

It was an anachronism to have a human receptionist in this hall of lucent plastic, among the machines that winked and talked between jade columns soaring up into vaulted dimness—but a remarkably pleasant one when she was as long-legged and red-headed a stun-blast as the girl behind the desk. Captain Torres drew to a crisp halt, and a gauntleted hand went to his gilt helmet. Traveling down sumptuous curves, his eye was jarred by the small needler at her waist.

"Good day, sir," she smiled. "One moment, please, I'll see if Freeman van Rijn is ready for you." She switched on the intercom and a three-megavolt oath bounced out. "No, he's still conferring on the vid. Won't you be seated?"

Before she turned it off, Torres

caught a few words: ". . . By damn, he'll give us the exclusive franchise or do without our business. Who do these little emperors think they are? All right, so he has a million soldiers under arms. You can tell him to take those soldiers, with field artillery and hobnailed boots, by damn, and—" *Click.*

Torres wrapped his cape about the deep-blue tunic and sat down, laying one polished boot across the other knee of his white culottes. He felt out of his depth, simultaneously overdressed and naked. The regalia of a Lodgemaster in the Federated Brotherhood of Spacemen was stiff with gold braid, medals, and jewelry, far removed from the gray coverall he wore on deck or the loungers of planet leave. Worse, the guards in the tower entrance, a kilometer below, had not only checked his credentials and retinal patterns, but had unloaded his sidearm.

Blast Nicholas van Rijn and the whole Polesotechnic League! Good saints, drop him on Pluto without his underwear!

Of course, a merchant prince did have to be wary of assassins—and most of them went to great lengths to avoid formal duels, though Van Rijn himself was supposed to be murderously fast with a handgun. Nevertheless, arming your receptionist was not a high-born thing to do—

Torres wondered, rather wistfully, if she was one of the old devil's mistresses. Perhaps not; but with the trouble between the Company—no, the whole League—and the Brotherhood, she'd have no time for him, being doubtless bound by a contract of personal fealty. His gaze went to the League emblem on the wall, a golden sunburst afire with opals, surrounding an ancient-style rocketship of the Caravel model, and the motto: *All the traffic will bear.* That could be taken two ways, he reflected sourly. Beneath it was the trademark of Van Rijn's own outfit, the Solar Spice & Liquors Company.

The girl turned on the intercom again and heard the vidophone being switched off; there followed a steady rumble of obscenities. "Go on in now, sir," she said, and into the speaker: "Captain Rafael Torres, representing the Brotherhood."

The spaceman straightened himself and went through the inner door. His lean dark face clamped into careful lines. It would be a new experience, meeting his ultimate boss; for ten years, as captain of a ship and Lodgemaster of the union local, he had not called anyone "sir."

The office was big, with an entire side transparent, overlooking a precipitous vista of Batavia's towers, green landscape, hot with tropical gardens, and the molten glitter of the Java Sea. The other walls were lined with the biggest referobot Torres had ever seen, with shelves of extraterrestrial curios, and—astonishingly—a thousand or more old-type folio books, exquisitely bound in tooled leather and looking

well-worn. The room and the desk were littered, close to maximum entropy, and the ventilators could not quite dismiss a tobacco haze. The most noticeable object on the desk was a small image of St. Dismas, carved from sandroot in the Martian style. The precise and perfect patron for Nicholas van Rijn, thought Torres.

He clicked his heels and bowed till the helmet plume swept his nose. "Lodgemaster-Captain Torres speaking for the Brotherhood, sir."

Van Rijn grunted. He was a huge man, two meters high, and the triple chin and swag belly did make him appear soft. Rings glittered on the hairy hands and bracelets on the thick wrists, under snuff-soiled lace. Small gray eyes, set close to the great hook nose under a sloping forehead, blinked at the spaceman. He went back to filling his churchwarden, and said nothing until he had a good head of steam up.

"So, by damn," he muttered then. "You speak for the whole louse-bound union, I hope." The long handlebar mustaches and goatee waggled over a gorgeously embroidered waistcoat. Beneath it was only a sarong, columnar legs and bare splay feet.

Torres checked his temper. "Yes, sir. For all the locals in the Solar Federation, and every other lodge within ten light-years. We understood that you would represent the League."

"Only tentatively. I will convey your demands to my colleagues, such of them as I can drag out of their offices and harems. Sit."

Torres did not give the chair an opportunity to mold itself to him; he sat on the edge and said harshly: "It's simple enough, sir. You already know our decision. We aren't calling a real strike . . . yet. We just refuse to take any more ships through the Kossaluth of Borthu till the menace there has been stopped. If you insist that we do so, we will strike."

"By damn, you cut your own throats," replied Van Rijn with surprising mildness. "Not alone the loss of pay and commissions. No, but if Antares is not kept steady supplied, she loses taste maybe for cinnamon and London dry gin. Not to speak of products offered by other companies. Like if Jo-Boy Technical Services bring in no more indentured scientists, Antares builds her own academies. Hell and lawyers! In a few years, no more market at Antares and all fifteen planets. You lose, I lose, we all lose."

"The answer is simple enough, sir. We just detour around the Kossaluth. I know that'll take us through more hazardous regions, we'll have more wrecks, but the brothers don't mind that risk."

"What?" Somehow, Van Rijn managed a basso scream. "Pest and cannon balls! Double the length of the voyage! Double the fuel bills, salaries, ship and cargo losses . . . halve the deliveries per year! We are ruined! Better we give up Antares at once!"

It was already an expensive route, Torres knew; whether or not the companies could actually afford the extra cost, he didn't know, for by the standard treaty which Sol had also signed, the League's books were its own secret. He waited out the dramatics, then said patiently:

"The Borthudian press gangs have been operating for two years now, sir. We've tried to fight them, and can't. We didn't make this decision overnight; if it had been up to the brothers at large, we'd have voted right at the start not to go through that hellhole. But the Lodgemasters held back, hoping something could be worked out. Apparently it can't."

"See here," growled van Rijn. "I don't like this losing of men and ships any better than you. Worse, maybe. A million credits a year or more it costs this company alone. But we can afford it. Only fifteen per cent of our ships are captured. We would lose more, detouring through the Gamma Mist or the Stonefields. Crewfolk should be men, not jellyfish."

"Easy enough for you to say!" snapped Torres. "We'll face meteors and dust clouds, rogue planets and hostile natives, warped space and hard radiation . . . but I've *seen* one of those pressed men. That's what decided me. I'm not going to risk it happening to me, and neither is anyone else."

"Ah, so?" Van Rijn leaned over the desk. "By damn, you tell me."

"Met him on *Arkan III*, autonomous planet on the fringe of the Kossaluth, where we put in to deliver some tea. One of their ships was in, too, and you can bet your brain we went around in armed parties and were ready to shoot anyone who even looked like a crimp. I saw him, this man they'd kidnaped, going on some errand, spoke to him, we even tried to snatch him back so we could bring him to Earth for deconditioning— He fought us and got away. God! He wasn't human any more, not inside. And still you could tell he wanted out, he wanted to break the conditioning, and he couldn't, *and he couldn't go crazy either—*"

Torres grew aware that Van Rijn was thrusting a full goblet into his hand. "Here, you drink this." It burned all the way down. "I have seen conditioned men. I was a rough-and-tumbler myself in younger days." The merchant went back behind his desk and rekindled his pipe. "It is a fiendish thing to do, *ja*."

"If you want to outfit a punitive expedition, sir," said Torres savagely, "I guarantee you can get full crews."

"No." The curled, shoulder-length black locks swished greasily as Van Rijn shook his head. "The League does not have many capital ships. It is unprofitable. The cost of a war with Borthu would wipe out ten years' gains. And then we will have trouble with the milksop governments of a hundred planets. No.'

"Isn't there some kind of pressure you can put on the Kossalu himself?"

"Hah! You think maybe we have

not tried? Economic sanctions do not work; they are not interested in trade outside their own empire. Threats they laugh at. They know they have more navy than we will ever build. Assassins never get close to the big potatoes." Van Rijn cursed for two straight minutes without repeating himself. "And there they sit, fat and greedy-gut, across the route to Antares and all stars beyond! It is not to be stood!"

He had been prowling the floor; now he whirled about with surprising speed for so large and clumsy a man. "This strike of yours brings it to a head. And speaking of heads, it is getting time for a tall cold beer. I shall have to confer with my fellows. Tell your men there will be steps taken if it is financially possible. Now get out!"

It is a truism that the structure of a society is basically determined by its technology. Not in an absolute sense—there may be totally different cultures using identical tools—but the tools settle the possibilities: you can't have interstellar trade without spaceships. A race limited to one planet, possessing a high knowledge of mechanics but with all its basic machines of commerce and war requiring a large capital investment, will inevitably tend toward collectivism under one name or another. Free enterprise needs elbow room.

Automation made manufacturing cheap, and the cost of energy nosedived when the proton converter was invented. Gravity control and the hyperdrive opened a galaxy to exploitation. They also provided a safety valve: a citizen who found his government oppressive could usually emigrate elsewhere, which strengthened the libertarian planets; their influence in turn loosened the bonds of the older world.

Interstellar distances being what they are, and intelligent races all having their own ideas of culture, there was no union of planetary systems. Neither was there much war: too destructive, with small chance for either side to escape ruin, and there was little to fight about. A race doesn't get to be intelligent without an undue share of built-in ruthlessness, so all was not sweetness and brotherhood—but the balance of power remained fairly stable. And there was a brisk demand for trade goods. Not only did colonies want the luxuries of home, and the home planets want colonial produce, but the old worlds had much to swap.

Under such conditions, an exuberant capitalism was bound to strike root. It was also bound to find mutual interests, to form alliances and settle spheres of influence. The powerful companies joined together to squeeze out competitors, jack up prices, and generally make the best of a good thing. Governments were limited to a few planetary systems at most; they could do little to control their cosmopolitan merchants. One by one, through bribery, coercion, or sheer despair, they gave up the struggle.

Selfishness is a potent force. Gov-

ernments, officially dedicated to altruism, remained divided; the Polesotechnic League became a supergovernment, sprawling from Canopus to Polaris, drawing its membership from a thousand species. It was a horizontal society, cutting across all political and cultural boundaries. It set its own policies, made its own treaties, established its own bases, fought its own minor wars—and, in the course of milking the Milky Way, did more to spread a truly universal civilization and enforce a lasting *Pax* than all the diplomats in the galaxy.

But it had its own troubles.

One of Nicholas van Rijn's mansions lay on the peak of Kilimanjaro, up among the undying snows. It was an easy spot to defend, and a favorite for conferences.

His gravcar slanted down through a night of needle-sharp stars, toward the high turrets and glowing lanterns. Looking through the roof, he picked out the cold sprawl of Scorpio. Antares flashed a red promise, and he shook his fist at the suns between. "So! Monkey business with Van Rijn, by damn. The whole Sagittarius clusters waiting to be opened, and you in the way. This will cost you money, my friends, gut and kipper me if it don't."

He thought back to days when he had ridden a bucketing ruin of a ship through the great hollow spaces, bargaining under green skies and in poisonous winds for jewels Earth had never seen before, and a moment's wistfulness tugged at him. A long time now since he had been any farther than the Moon . . . poor old fat man, chained to one miserable planet and unable to turn an honest credit. The Antares route was more important than he dared admit; if he lost it, he lost his chance at the Sagittarian developments to corporations with offices on the other side of the Kossaluth. In today's pitiless competition, you either went on expanding or you went under. And he had made too many enemies, they were waiting for the day of his weakness.

The car landed itself, and the guards jumped out to flank him. He wheezed the thin chill air into sooty lungs, drew his cloak of phosphorescent onthar skin tightly about him, and scrunched across frosty paving to the house. There was a new maid at the door, pretty little baggage . . . Venusian-French, was she? He tossed his plumed hat at her as the butler said the Freemen were already here. He sat down and told the chair "Conference Room" and went along corridors darkly paneled in the wood of a hundred planets.

There were four colleagues around the table when he entered. Kraaknach of the Martian Transport Company was glowing his yellow eyes at a Frans Hals on the wall. Firmage of North American Engineering puffed an impatient cigar. Mjambo, who owned Jo-Boy Technical Services—which supplied indentured labor to colonial planets—was talking into his wristphone. Gornas-Kiew

happened to be on Earth and was authorized to speak for the Centaurians; he sat quietly waiting, hunched into his shell, only the delicate antennae moving.

Van Rijn plumped himself into the armchair at the head of the table. Waiters appeared with trays of drinks, smokes, and snacks. He took a large bite from a ham sandwich and looked inquiringly at the others.

Kraaknach's owl-face turned to him. "Well, Freeman host, I understand we are met on account of this Borthudian *brokna.* Did the spacemen make their ultimatum?"

"*Ja.*" Van Rijn picked up a cigar and rolled it between his fingers. "It grows serious. They will not take ships through the Kossaluth, except to get revenge, while this shanghai business goes on."

"So why not blast the Borthudian home planet?" asked Mjambo.

"Death and damnation!" Van Rijn tugged at his goatee. "I had a little computation run off today. Assuming we lost no ships—and Borthu has good defenses—but allowing for salaries, risk bonus, fuel, ammunition, maintenance, depreciation, estimated loss due to lack of protection elsewhere, lawsuits by governments afraid the Kossaluth may strike back, bribes, and loss of profits to be had if the cost were invested peaceably —the bill for that little operation would come to about thirty trillion credits. In a nutshell, we cannot afford it. Simmons, a bowl of Brazils!"

"You will pardon my ignorance, good sirs," clicked Gornas-Kiew's artificial vocalizer. "My main interests lie elsewhere, and I have been only marginally aware of this trouble. *Why* are the Borthudians impressing our men?"

Van Rijn cracked a nut between his teeth and reached for a glass of brandy. "The gruntbrains have not enough of their own," he replied shortly.

"Perhaps I can make it clear," said Kraaknach. Like most Martians of the Sirruch Horde, he had a mind orderly to the point of boredom. He ran a clawlike hand through his gray feathers and lit a rinn-tube. "Borthu is a backward planet . . . terrestroid to eight points, with humanoid natives. They were in the early stage of nuclear energy when explorers visited them seventy-eight years ago, and their reaction to the presence of a superior culture was paranoid. They soon learned how to make modern engines of all types, and then set out to conquer themselves an empire. They now hold a volume of space about forty light-years across, though they only occupy a few Sol-type systems within it. They want nothing to do with the outside universe, and are quite able to supply all their needs within their own boundaries—with the one exception of efficient spacemen."

"Hm-m-m," said Firmage. "Their commoners might see things differently, if we could get a few trading ships in there. I've already suggested we use subversive agents—get the Kossalu and his whole bloody gov-

ernment overthrown from within."

"Of course, of course," said van Rijn. "But that takes more time than we have got, unless we want Spica and Canopus to sew up the Sagittarius frontier while we are stopped dead here."

"To continue," said Kraaknach, "the Borthudians can produce as many spaceships as they want, which is a great many since their economy is expanding. In fact, its structure—capitalism not unlike ours—requires constant expansion if the whole society is not to collapse. But they cannot produce trained crews fast enough. Pride, and a not unjustified fear of our gradually taking them over, will not let them send students to us any more, or hire from us, and they have only one understaffed academy of their own."

"I know," said Mjambo. "It'd be a hell of a good market for indentures if we could change their minds for them."

"Accordingly, they have in the past two years taken to waylaying our ships—in defiance of us and of all interstellar law. They capture the men, hypnocondition them, and assign them to their own merchant fleet. It takes years to train a spaceman; we are losing an important asset in this alone."

"Can't we improve our evasive action?" wondered Firmage. "Interstellar space is so big. Why

can't we avoid their patrols altogether?"

"Eighty-five per cent of our ships do precisely that," Van Rijn told him. "But the hyperdrive vibrations can be detected a light-year away if you have sensitive instruments—pseudogravitational pulses of infinite velocity. Then they close in, using naval vessels which are faster and more maneuverable than merchantmen. It will not be possible to cut our losses much by evasion tactics. Satan and small pox! You think maybe I have not considered it?"

"Well, then, how about convoying our ships through?"

"At what cost? I have been with the figures. It would mean operating the Antares run at a loss—quite apart from all the extra naval units we would have to build."

"Then how about arming our merchantmen?"

"Bah! A frigate-class ship needs twenty men for all the guns and instruments. A merchant ship needs only four. Consider the salaries paid to spacemen. And sixteen extra men on every ship would mean cutting down all our operations elsewhere, for lack of crews. Same pestiferous result: we cannot afford it, we would lose money in big fat gobs. What is worse, the Kossalu knows we would. He need only wait, holding back his fig-plucking patrols, till we were too broke to continue. Then he would be able to start conquering systems like Antares."

Firmage tapped the inlaid table with a restless finger. "Bribery, assassination, war, political and economic pressure, all seem to be ruled out," he said. "The meeting is now open to suggestions."

There was a silence, under the radiant ceiling.

Gornas-Kiew broke it: "Just how is this shanghaiing done? It is impossible to exchange shots while in hyperdrive."

"Well, good sir, statistically impossible," amended Kraaknach. "The shells have to be hypered themselves, of course, or they would revert to sublight velocity and be left behind as soon as they emerged from the drive field. Furthermore, to make a hit, they would have to be precisely in phase with the target. A good pilot can phase in on another ship, but the operation is too complex, it involves too many factors, for any artificial brain of useful size."

"I tell you how," snarled Van Rijn. "The pest-bedamned Borthudian ships detect the vibration-wake from afar. They compute the target course and intercept. Coming close, they phase in and slap on a tractor beam. Then they haul themselves up alongside, burn through the hull or the air lock, and board."

"Why, the answer looks simple enough," said Mjambo. "Equip our boats with pressor beams. Keep the enemy ships at arm's length."

"You forget, esteemed colleague, that beams of either positive or negative sign are powered from the engines," said Kraaknach. "And a

naval ship has larger engines than a merchantman."

"Well, then, why not arm our crews? Give 'em heavy blasters and let 'em blow the boarding parties to hell."

"The illegitimate-offspring-of-interspecies-crosses Borthudians have just such weapons already," snorted Van Rijn. "Sulfur and acid! Do you think that four men can stand off twenty?"

"Mm-m-m . . . yes, I see your point," agreed Firmage. "But look here, we can't do anything about this without laying out *some* cash. I'm not sure offhand what our margin of profit is—"

"On the average, for all our combined Antarean voyages, about thirty per cent on each voyage," said Van Rijn promptly.

Mjambo started. "How the devil do you get the figures for *my* company?"

Van Rijn grinned and drew on his cigar.

"That gives us a margin to use," said Gornas-Kiew. "We can invest in fighting equipment to such an extent that our profit is less—though I agree there must still be a final result in the black—for the duration of the emergency."

"Ja," said Van Rijn, "only I have just told you we have not the men available to handle such fighting equipment."

"It'd be worth it," said Mjambo viciously. "I'd take a fair-sized loss just to teach them a lesson."

"No, no." Van Rijn lifted a hand which, after forty years of offices, was still the broad muscular paw of a working spaceman. "Revenge and destruction are un-Christian thoughts. Also, they will not pay very well, since it is hard to sell anything to a corpse. The problem is to find some means within our resources which will make it *unprofitable* for Borthu to raid us. Not being stupid heads, they will then stop raiding and we can maybe later do business."

"You're a cold-blooded one," said Firmage.

Van Rijn drooped his eyes and covered a shiver by pouring himself another glass. He had suddenly had an idea.

He let the others argue for a fruitless hour, then said: "Freemen, this gets us nowhere, *nie?* Perhaps we are not stimulated enough to think clear."

"What would you suggest?" asked Mjambo wearily.

"Oh . . . an agreement. A pool, or prize, or reward for whoever solves this problem. For example, ten per cent of all the others' Antarean profits for the next ten years."

"Hoy, there!" cried Firmage. "If I know you, you robber, you've just come up with the answer."

"Oh, no, no, no. By good St. Dismas I swear it. I have some beginning thoughts, maybe, but I am only a poor rough old space walloper without the fine education all you Freemen had. I could so easy be wrong."

"What is your idea?"

"Best I not say just yet, until it

is more clear in my thick head. But please to note, he who tries solving this problem takes on all the risk, and it may well be some small expense. Also, without his solution nobody has any more profits. Does not a little return on his investment sound fair and proper?"

There was more argument. Van Rijn smiled with infinite benevolence.

He was satisfied with an agreement in principle, sworn to by mercantile honor, the details to be computed later.

Beaming, he clapped his hands. "Freemen, we have worked hard tonight and soon comes much harder work. By damn, I think we deserve a little celebration. Simmons, prepare an orgy."

Captain Torres was shocked. "Are you seriously asking us to risk that?"

Van Rijn stared out through the office wall. "In all secrecy," he answered. "I must have a crew I can trust."

"But—"

"We will not be stingy with the bonuses."

Torres shook his head. "Sir, I'm afraid it's impossible. The Brotherhood has voted absolute refusal of any trips into the Kossaluth except punitive expeditions—which this one is not. Under the constitution, we can't change that policy without another vote, which would have to be a public matter."

"It can be publicly voted on after we see if it works," urged Van Rijn. "The first trip will have to be secret."

"Then the first trip will have to do without a crew."

"Rot and pestilence!" Van Rijn's fist crashed down on the desk and he surged to his feet. "What sort of cowards do I deal with? In my day we were men! We would have sailed through Hell's open gates if you paid us enough!"

Torres sucked hard on his cigarette. "I'm stuck with the rules, sir," he declared. "Only a Lodgemaster can . . . well, all right, let me say it!" His temper flared up. "You're asking us to take an untried ship into enemy sky and cruise around till we're attacked. If we succeed, we win a few measly kilocredits of bonus. If we lose, we're condemned to a lifetime of purgatory, locked up in our own skulls and unable to will anything but obedience and *knowing* how our brains have been chained. Win, lose, or draw for us, you sit back here plump and safe and rake in the money. *No!*"

Van Rijn sat quiet for a while. This was something he had not foreseen.

His eyes wandered forth again, to the narrow sea. There was a yacht out there, a lovely thing of white sails and gleaming brass. Really, he ought to spend more time on his own ketch—money wasn't as important as all that. It was not such a bad world, this Earth, even for a lonely old fat man, it was full of blossoms and good wine, clean winds and beautiful women and fine books. In his forebrain, he knew how much his memories of earlier days were

colored by nostalgia—space is big and cruel, not meant for humankind. Let's face it, here on Earth we belong.

He turned around. "You say a Lodgemaster can legally come on such a trip without telling anyone, he remarked quietly. "You think you can raise two more like yourself, hah?"

"I told you, we won't! And you're only making it worse. Asking an officer to serve as a common crewhand is grounds for a duel."

"Even if I myself am the skipper?"

The *Mercury* did not, outwardly, look different after the engineers were finished with her. And the cargo was the same as usual: cinnamon, ginger, pepper, cloves, tea, whiskey, gin. If he was going to Antares, Van Rijn did not intend to waste the voyage. Only wines were omitted from the list, for he doubted if they could stand a trip as rough as this one was likely to be.

The alteration was internal, extra hull bracing and a new and monstrously powerful engine. The actuarial computers gave the cost of such an outfitting—averaged over many ships and voyages—as equal to three times the total profit from all the vessel's Antarean journeys during her estimated lifetime. Van Rijn had winced, but ordered his shipyards to work.

It was, in all truth, a very slim margin he had, and he had gambled more on it than he could afford. But if the Kossalu of Borthu had statistical experts of his own—always assuming, of course, that the idea worked in the first place—

Well, if it didn't, Nicholas van Rijn would die in battle or be executed as useless; or end his days as a brain-channeled slave on a filthy Borthudian freighter; or be held for a ruinous ransom. The alternatives all looked equally bad.

He installed himself, the dark-haired and multiply curved Dorothea McIntyre, and a good supply of brandy, tobacco, and ripe cheese, in the captain's cabin. One might as well be comfortable. Torres was his mate, Captains Petrovich and Seichi his engineers. The *Mercury* lifted from Quito Spaceport without fanfare, hung unpretentiously in orbit till clearance was given, and accelerated on gravity beams away from the sun. At the required half-billion kilometers' distance, she went on hyperdrive and outpaced light.

Van Rijn sat back on the bridge and stuffed his churchwarden. "Now is a month's voyage to Antares," he said piously. "Good St. Dismas watch over us."

"I'll stick by St. Nicholas,' murmured Torres. "Even if you do bear the same name."

Van Rijn looked hurt. "Do you not respect my integrity?"

Torres grinned. "I admire your courage—nobody can say you lack guts and you may very well be able to pull this off. Set a pirate to catch a pirate."

"You younger generations have a

loud mouth and no courtesy." The merchant lit his pipe and blew reeking clouds. "In my day we said 'sir' to the captain even when we mutinied."

"I'm worrying about one thing," said Torres. "I realize that the enemy probably doesn't know about the strike yet, and so they won't be suspicious of us—and I realize that by passing within one light-year of Borthu itself we're certain to be attacked—but suppose half a dozen of them jump us at once?"

"On the basis of what we know about their patrol patterns, the estimated probability of more than one ship finding us is only ten per cent, plus or minus three." Van Rijn heaved his bulk onto his feet. One good thing about spacefaring, you could set the artificial gravity low and feel almost young again. "What you do not know so well yet, my young friend, is that there are very few certainties in life. Always we must go on probabilities. The secret of success is to arrange things so the odds favor you—then in the long run you are sure to come out ahead. It is your watch now, and I recommend to you a book on statistical theory to pass the time. As for me, I will be in conference with Freelady McIntyre and a liter of brandy."

"I wish I could arrange my own captain's chores the way you do," said Torres mournfully.

Van Rijn waved an expansive hand. "Why not, my boy, why not? So long as you make money and no trouble for the Company, the Company does not interfere with your private life. The trouble with you younger generations is you lack initiative. When you are a poor old feeble fat man like me you will look back and regret so many lost opportunities."

Even in low-gee, the deck vibrated under his tread as he left.

Here there was darkness and cold and a blazing glory of suns. The viewscreens held the spilling silver of the Milky Way, the ruby spark of Antares among distorted constellations, the curling edge of a nebula limned by the blue glare of a dwarf star. Brightest among the suns was Borthu's, yellow as minted gold.

The ship drove on through night, pulsing in and out of four-dimensional reality and filled with awaiting.

Dorothea sat on a wardroom couch, posing long legs and high prow with a care so practiced as to be unconscious. She could not get her eyes from the screen.

"It's beautiful," she said in a small voice. "And horrible."

Nicholas van Rijn sprawled beside her, his majestic nose aimed at the ceiling. "What is so bad, my little sinusoid?"

"Them . . . lying out there to pounce on us and— Why did I come? Why did I let you talk me into it?"

"I believe there was mention of a tygron coat and Santorian flamedrop earrings."

"But suppose they catch us!" Her

fingers fell cold on his wrist. "What will happen to me?"

"I told you I have set up a ransom fund for you. I also warned you maybe they would not bother to collect, and maybe we get broken to bits in this fight and all die. Satan's horns and the devil who gave them to him! Be still, will you?"

The intraship speaker burped and Torres' voice said: "Wake of high-powered ship detected, approaching from direction of Borthu."

"All hands to posts!" roared Van Rijn.

Dorothea screamed. He picked her up under one arm, carried her down the hall—collecting a few scratches and bruises en route—tossed her into his cabin, and locked the door. Puffing, he arrived on the bridge. The visual intercom showed Petrovich and Seichi, radiation-armored, the engines gigantic behind them. Their faces were drawn tight and glistening with sweat. Torres was gnawing his lip, fingers shaking as he tuned in the hypervid.

"All right," said Van Rijn, "this is the thing we have come for. I hope you each remember what you have to do, because if not we will soon be very dead." He dropped into the main control chair and buckled on the harness. His fingers tickled the keys, feeling the sensitive response of the ship. So far they had been using only normal power, the great converter had been almost idling; it was good to know how many wild horses he could call up.

The hypervid chimed. Torres pressed the *Accept* button and the screen came to life.

It was a Borthudian officer who looked out at them. Skin-tight garments were dead black on the catlithe frame. The face was almost human, but hairless and tinged with blue; yellow eyes smoldered under the narrow forehead. Behind him could be seen the bridge, a crouching gunnery officer, and the usual six-armed basalt idol.

"Terran ship ahoy!" He ripped out crisp, fluent Anglic, only subtly accented by a larynx and palate of different shape. "This is Captain Rentharik of the Kossalu's frigate *Gantok*. By the law, most sacred, of the Kossaluth of Borthu, you are guilty of trespass on the dominions of His Frightfulness. Stand by to be boarded."

"By double damn, you out-from-under-wet-logs-crawling poppycock!" Van Rijn flushed turkey red. "Not bad enough you pirate my men and ships, with all their good expensive cargoes, but you have the copper-bound nerve to call it legal!"

Rentharik fingered the ceremonial dagger hung about his neck. "Old man, the writ of the Kossalu runs through this entire volume of space. You can save yourself punishment—nerve-pulsing, to be exact—by surrendering peacefully and submitting to judgment."

"By treaty, open space is free to ships of all planets," said Van Rijn. "And it is understood by all *civilized* races that treaties override any local law."

Rentharik smiled bleakly. "Force is the basis of law, captain."

"*Ja,* it is, and now you make the mistake of using force on Van Rijn! I shall have a surprise for your strutting little slime mold of a king."

Rentharik turned to a recorder tube and spoke into it. "I have just made a note to have you assigned to the Ilyan run after conditioning. We have never found any way to prevent seepage of the Ilyan air into the crewmen's helmets; and it holds chlorine."

Van Rijn's face lit up. "That is a horrible waste of trained personnel, captain. Now it so happens that on Earth we can make absolutely impervious air systems, and I would gladly act as middleman if you wish to purchase them—at a small fee, of course."

"There has been enough discussion," said Rentharik. "You will now be grappled and boarded. There is a fixed scale of punishments for captured men, depending on the extent of their resistance."

The screen blanked.

Torres licked sandy lips. Tuning the nearest viewscreen, he got the phase of the Borthudian frigate. She was a black shark-form, longer and slimmer than the dumpy merchantman, of only half the tonnage but with armor and gun turrets etched against remote star-clouds. She came riding in along a curve that would have been impossible without gravit-

ic acceleration compensators, matching velocities in practiced grace, until she loomed huge a bare kilometer away.

The intercom broke into a scream. Van Rijn swore as he saw Dorothea having hysterics in the cabin. He cut her out of the circuit and thought with anguish that she would probably smash all the bottles—and Antares still eleven days off!

There was a small, pulsing jar. The *Gantok* was in phase and the gravity-fingers of a tractor beam had reached across to lay hold of the *Mercury*.

"Torres," said Van Rijn. "You stand by, boy, and take over if anything happens to me. I may want your help anyway, if it gets too rough. Petrovich, Seichi, you got to maintain our beams and hold 'em tight, no matter what the enemy does. O.K.? We go!"

The *Gantok* was pulling herself in, hulls almost touching now. Petrovich kicked in the full power of his converter. Arcs blazed blue with million-volt discharges, the engine bawled, and ozone was spat forth sharp and smelling of thunder.

A pressor beam lashed out, an invisible hammerblow of repulsion, five times the strength of the enemy tractor. Van Rijn heard the *Mercury's* ribs groan with the stress. The *Gantok* shot away, turning end over end. Ten kilometers removed, she was lost to vision among the stars.

"Ha, ha!" bellowed van Rijn. "We spill all their apples, eh? By damn! Now we show them some fun!"

The Borthudian hove back into sight. She clamped on again, full strength attraction. Despite the pressor, the *Mercury* was yanked toward her with a brutal surge of acceleration. Seichi cursed and threw in all the pressor power he had.

For a moment Van Rijn thought his ship would burst open. He saw the deckplates buckle under his feet and heard steel shear. Fifty million tons of force were not to be handled lightly. The *Gantok* was batted away as if by a troll's fist.

"Not so far! Not so far, you dumbhead! Let me control the beams." Van Rijn's hands danced over the pilot board. "We want to keep him for a souvenir!"

He used a spurt of drive to overhaul the *Gantok*. His right hand steered the *Mercury* while his left wielded the tractor and the pressor, seeking a balance. The engine thunder rolled and boomed in his skull. The acceleration compensator could not handle all the fury now loosed, and straps creaked as his weight was hurled against them. Torres, Petrovich, and Seichi were forgotten, part of the machinery, implementing the commands his fingers gave.

Now thoroughly scared, the Borthudian opened her drive to get away. Van Rijn equalized positive and negative forces, in effect welding himself to her hull by a three-kilometer bar. Grinning, he threw his superpowered engine into reverse.

The *Gantok* strained to a halt and went backwards with him.

Lightning cracked and crashed over his engineers' heads. The hull shuddered as the enemy fought to break free. Her own drive was added to the frantic repulsion of her pressors, and the gap widened. Van Rijn stepped down his own pressors. When she was slammed to a dead stop, the blow echoed back at him.

"Ha, like a fish we play him! Good St. Peter the Fisherman, help us not let him get away!"

It was a bleak and savage battle, nine and a half trillion empty kilometers from anyone's home, with no one to watch but the stars. Rentharik was a good pilot, and a desperate one. He had less power and less mass than the *Mercury,* but he knew how to use them, lunging, bucking, wheeling about in attempts to ram. Live flesh could only take so much, thought Van Rijn while the thunders clattered around him. The question was, who would have to give up first?

Something snapped, loud and tortured, and he felt a rush of stinging electrified air. Petrovich cried it for him: "Burst plate—Section Four. I'll throw a patch on, but someone's got to weld it back or we'll break in two."

Van Rijn signaled curtly to Torres. "Can you play our fish? I think he is getting tired. Where are the bedamned spacesuits?"

He reeled from his chair and across the pitching deck. The *Gantok* was making full-powered leaps, trying to stress the *Mercury* into ruin. By varying their own velocity and beam-force, the humans could nullify most of the effect, but it took skill and nerve. God, but it took nerve! Van Rijn felt his clothes drenched on his body.

He found the lockers and climbed awkwardly into his specially built suit. Hadn't worn armor in a long time—forgotten how it stank. Where was that beblistered torch, anyhow? When he got out on the hull, surrounded by the blaze of all the universe, fear was cold within him.

One of those shocks that rolled and yawed the ship underfoot could break the gravitic hold of his boots. Pitched out beyond the hyperdrive field and reverting to normal state, he would be forever lost in a microsecond as the craft flashed by at translight speeds. It would be a long fall through eternity.

Electric fire crawled over the hull. He saw the flash of the *Gantok's* guns—she was firing wildly, on the one-in-a-billion chance that some shell would happen to be in phase with the *Mercury.* Good—let her use up her ammunition. Even so, it was a heart-bumping eerie thing when a nuclear missile passed through Van Rijn's own body. No, by damn, through the space where they coexisted with different frequencies—must be precise—now here is that fit-for-damnation hull plate. Clamp on the jack, bend it back toward shape. Ah, heave ho, even with hydraulics it takes a strong man to

do this, maybe some muscle remains under all that goose grease. Slap down your glare filter, weld the plate, handle a flame and remember the brave old days when you went hell-roaring halfway across this arm of the galaxy. Whoops, that lunge nearly tossed him off into God's great icebox!

He finished his job, reflected that there would have to be still heavier bracing on the next ship of this model, and crept back to the air lock, trying to ignore the ache which was his body. As he entered, the rolling and plunging and racketing stopped. For a moment he thought he had been stricken deaf.

Then Torres' face swam into the intercom, wet and haggard, and said hoarsely: "They've quit. I don't think they expect their own boat can take any more of this—"

Van Rijn straightened his bruised back and whooped. "Excellent! Wonderful! But pull us up alongside quick, you lardhead, before—"

There was the twisting sensation of reversion to normal state, and the hyperdrive noise spun into silence. Van Rijn lost his footing as the *Mercury* sprang forward and banged against the enemy.

It had been an obvious tactic for Rentharik to use: Switching off his interstellar drive, in the hope that the Terran ship would remain hyper and flash so far away he could never be found again. The answer was equally simple—a detector coupled to an automatic cutoff, so that the *Mercury* would instantly do likewise. And now the League ship was immediately alongside the *Gantok,* snuggled beneath the very guns the frigate could no longer bring to bear and held by a tractor force she could not break.

Van Rijn struggled back to his feet and removed his helmet. The intercom blushed at his language.

"Captain!" Petrovich yelped the realization. *"They're going to board us!"*

"Name of Judas!" Van Rijn's breastplate clashed on the deck. "Must I do all your thinking for you? What use is our pressor if not to swat off unwelcome guests?" He threw back his head and bellowed with laughter. "Let them try, let them try! Our drive field envelops theirs, so it does not matter whether they use their engines or not—and we are stronger, *nie?* We can drag them with us even if they fight it. All my life I have been a deep-sea fisherman. And now, full speed ahead to Antares with this little minnow that thought it was a shark!"

A hypervid call to Antares as soon as they were in range brought a League cruiser out to meet them. Van Rijn turned the *Gantok* over to her and let Torres pilot the battered *Mercury* in. Himself, he wanted only to sleep.

Not that the Borthudians had tried any further stunts, after their boarding party was so cold-bloodedly shoved into deep space. Rentharik was sensible enough to know when he was beaten, and had passively let

his ship be hauled away. But the strain of waiting for any possible resistance had been considerable.

Torres had wanted to communicate with the prisoned crew, but Van Rijn would not allow it. "No, no, my boy, we demoralize them more by refusing the light of our eyes. I want the good Captain Rentharik's fingernails chewed down to the elbow when I see him."

That was in the governor's mansion, in Redsun City. Van Rijn had appropriated it for his own use, complete with wine cellar and concubines. Between banquets he had found time to check on local prices and raise the tag on pepper a millicredit per gram. The colonists would grumble, but they could afford it; if it weren't for him, their meals would be drab affairs, so didn't he deserve an honest profit?

After three days of this, he decided it was time to see Rentharik. He lounged on the governor's throne, pipe in one hand.

Rentharik advanced across the parquet floor, gaunt and bitter under the guns of two League guardsmen. He halted before the throne.

"Ah, so. There you are!" Van Rijn beamed and waved the bottle. "I trust you have had the pleasant stay? Redsun City jails are much recommended, I am told."

"My government will take measures," spat the Borthudian. "You will not escape the consequences of this piracy."

"Your maggoty little kinglet will do nothing of the sort," declared Van Rijn. "If the civilized planets did not dare fight when he was playing buccaneer, he will not when it is the other way around. He will accept the facts and learn to love them."

"What do you plan to do with us?"

"Well, now, it may be we can collect a little ransom for you, perhaps, eh? If not, the local iron mines are always short of labor. But out of the great goodness of my heart, I let you choose one man who may go home freely and report what has happened. After that we negotiate."

Rentharik narrowed his lids. "See here. I know how your filthy trading system works. You won't do anything that doesn't pay you. And to equip a vessel like yours—one able to capture a warship—costs more than the vessel could ever hope to earn."

"Quite so. It costs just about three times as much."

"So . . . we'll ruin the Antares route for you! Don't think we'll give up our patrols in our own sovereign territory. We can outlast you, if you want a struggle of attrition."

"Ah!" Van Rijn waggled his pipestem. "That is what you cannot do, my friend. You can reduce our profit considerably, but you cannot eliminate it; therefore, we can continue the route indefinitely under present conditions. You see, each voyage nets a thirty per cent profit."

"And it costs three hundred per cent of your profit to outfit a ship—"

"Indeed. But we are only so equipping every *fourth* ship. That means we operate on a smaller margin, yes, but a little arithmetic should show you we can still scrape by in the black ink."

"Every f o u r t h—!" Rentharik shook his head, frankly puzzled. "But what will you gain? Out of every four encounters, we will win three."

"Just so. And by those three victories, you will capture twelve slaves. The fourth time, we rope in twenty Borthudian spacemen. Naturally, you will never know beforehand which ship is going to be the one that can fight back. You will either have to give up your press gangs or see them whittled away." Van Rijn rubbed his horny palms together. "So you see, by damn, always I operate on the statistics, and always I load the statistics. My friend, you have had it edgewise."

Rentharik crouched where he stood and blazed at his captor: "I learned, here, that your union will not travel through the Kossaluth. Do you think reducing the number of impressed men by one fourth will change their minds?"

Van Rijn grinned. "If I know my spacemen—why, of course. Because if you do continue to raid us, you will soon reduce yourselves to so few crews as to be helpless. Then you will *have* to deal with us, and our terms will include freeing of all the slaves, deconditioning, and good fat indemnities. Any man worth his salt can stand a couple years' service, even on your moldy rustbuckets, if he knows he will then be freed and paid enough to retire on."

He cleared his throat, buttered his tone, and went on: "So is it not wise that you make terms at once? We will be very lenient if you do. You will have to release and indemnify all your present captives, and stop raiding, but you can send students to our academies at not much more than the usual fees. We will want a few minor trade concessions as well, of course—"

"And in a hundred years you'll own us!" It was a snarl.

"If you do not agree, by damn, in three years we will own you. The choice is yours. You must have a continuously expanding supply of spacemen or your economy collapses. You can either let us train them in civilized fashion, and give us a wedge by which we ruin you in three generations, or you can impress them and be ruined inside this decade. Pick your man; we will let him report to your king-pig. And never forget that I, Nicholas van Rijn of the Polesotechnic League, do nothing without very good reason. Even the name of my ship could have warned you."

"The name—?" whispered Rentharik.

"*Mercury*," explained van Rijn, "was the god of commerce, gambling —and thieves."

THE END

THE SWAMP WAS UPSIDE DOWN

If you have enough different kinds of troubles, all at once, and you can just think fast enough . . . maybe you can get the lions eating the wolves, and the snakes biting the lions?

BY MURRAY LEINSTER

Illustrated by Freas

I

Hardwick knew the Survey ship had turned end for end, because though there was artificial gravity, it does not affect the semicircular canals of the human ear. He knew he was turning head-over-heels, even though his feet stayed firmly on the floor. It was not a normal sensation, and he felt that queasy, instinctive tightening of the muscles with which one reacts to the abnormal, whether in things seen or felt.

But the reason for turning the ship end-for-end was obvious. It had arrived very near its destination, and was killing its Lawlor-drive momentum. Just as Hardwick was assured that the turning motion was finished, young Barnes—the ship's lowest-ranking commissioned officer—came into the wardroom and beamed at him kindly.

"The ship's not landing, sir," he said gently, like one explaining something to somebody under ten years old. "Our orders are changed. You're to go to ground by boat. This way, sir."

Hardwick shrugged. He was a Senior Officer of the Colonial Survey, and this was a Survey ship, and it had been sent especially to get him from his last and still unfinished job. It was a top-urgency matter. This ship had had no other business for some months except to go after and bring him to Sector Headquarters, down on Canna III which must be somewhere near. But this young officer was patronizing him!

Hardwick rather regretfully recognized that he didn't know how to be impressive. He was not a good salesman of his own importance. He didn't even get the urgent respect due his rank—and when one thought

about it, it was amazing that he'd ever reached a high level in the Survey.

Now the young officer waited, brisk and kindly and blandly alert in manner. Hardwick reflected wryly that he could pin young Barnes' ears back easily enough. But he remembered when he'd been a junior Survey ship's officer. Then he'd felt a serene condescension toward all people of whatever rank who did not spend their lives in the cramped, skimped quarters of a Survey patrolship. If this young Lieutenant Barnes were fortunate, he'd always feel that way. Hardwick could not begrudge him the cockiness which made the tedium and hardships of the Service seem to him a privilege.

So he quite obediently followed Barnes through the wardroom door. He ducked his head under a ventilation slot and sidled past a standpipe with bristling air-valve handles. It almost closed the way. There was the smell of oil and paint and ozone which all proper Survey ships maintain in their working sections.

"Here, sir," said Barnes paternally. "This way."

He offered his arm for Hardwick to steady himself by. Hardwick ignored it. He stepped over a complex of white-painted pipes. He arrived at an almost clear way to a boat-blister.

"And your luggage, sir," added the young man reassuringly, "will follow you down immediately, sir. With the mail."

Hardwick nodded. He moved toward the blister door. He practically egded past constrictions due to new equipment. The Survey ship had been designed a long time ago, and there were no funds for rebuilding when improved devices came along. So any Survey ship was apt to be cluttered up with afterthoughts in metal.

A speaker from the wall said sharply:

"Hear this! Hold fast! Gravity going off!"

Hardwick caught at a nearby pipe, and snatched his hand away again—it was hot—and caught on to another and then put his other hand below. He applied a trifle of pressure. The young officer said kindly:

"Hold fast, sir. The ship's gravity is going off. If I may suggest—"

The gravity did go off. Hardwick grimaced. There'd been a time when he was used to such matters. This time the sudden outward surge of his breath caught him unprepared. His diaphragm contracted as the weight of organs above it ceased to be. He choked for an instant. He was irritated. He said evenly:

"I am not likely to go head-over-heels, lieutenant. I served four years as a junior swot on a ship exactly like this!"

He did not float about. He held onto a pipe in two places, and he applied expert pressure in a strictly professional manner, and his feet remained firmly on the floor. He startled young Barnes by the achieve-

ment, which only junior swots think only junior swots know about.

Barnes said, abashed:

"Yes, sir." He held himself firm in the same fashion.

"I even know," said Hardwick crisply, "that the gravity had to be cut off because we're approaching another ship on Lawlor drive. Our gravity-coils would blow if we got into her field with our drive off, or if her field pressed ours inboard."

Young Barnes looked extremely uncomfortable. Hardwick felt sorry for him. To be chewed—however delicately—for patronizing a senior officer could not be pleasant. So Hardwick added:

"And I also remember that, when I was a junior swot I once tried to tell a Sector Chief how to top off his suit-tanks. So don't let it bother you!"

The young officer was embarrassed. But a Sector Chief was so high in the table of Survey organization that one of his idle thoughts was popularly supposed to be able to crack a junior officer's skull. If Hardwick, as a young officer, had really tried to tell a Sector Chief how to top his suit-tanks . . . Why . . .

"Thank you, sir," said Barnes awkwardly. "I'll try not to be an ass again, sir."

"I suspect," said Hardwick, "that you'll slip occasionally. I did! What the devil's another ship doing out here and why aren't we landing?"

"I wouldn't know, sir," said the young officer respectfully. His manner toward Hardwick was quite

changed. "I do know the Skipper came in expecting to land, sir, by the landing-grid, sir. He was told to stand off. He's as much surprised as you are, sir."

The wall-speaker said crisply:

"Hear this! Gravity returning! Gravity returning!"

And weight came back. Hardwick was ready for it this time and took it casually. He looked at the speaker and it said nothing more. He nodded to the young man.

"I suppose I'd better get in the boat. No change in that arrangement, anyhow!"

He crawled through the blister door and wormed his way into the landing-boat—designed for a more modern ship, and excessively inconvenient in such an outmoded launching-device. Barnes crawled in after him.

"Excuse me, sir. I'm to take you down."

He dogged the blister door from the inside, closed the boatport and dogged it, and flipped a switch.

"Ready for departure," he said into a microphone.

A dial on the instrument board flicked halfway to zero. It stopped there. Seconds passed. A green light glowed. The young officer said:

"All tight!"

The needle darted a quarter-way farther over, and then began to descend slowly. The blister was being pumped empty of air. Presently another light glowed.

"Ready for launching," said the young officer briskly.

There were clankings. The blister-seal broke, and the two halves of the boat cover drew back. There were stars. To Hardwick they were unfamiliarly arranged, but he could have picked out Seton and the Donis cluster in any case, and half a hundred more markers by taking thought of the position of the planet Canna III, on which Colonial Survey Sector Headquarters for this part of the galaxy were established.

The boat moved gently out of its place and the ship's gravity field ended as abruptly as such fields do.

The Survey ship floated away, as seen from the vision ports of the boat. It apparently increased its drive, because the boat swirled and swayed as changing eddy-currents moved it. The ship grew small and vanished. The boat hung in emptiness, turning slowly. The sun Canna came into view. It was very large for a Sol-type sun, and its rim was almost devoid of the prominences and jet streams of flaming gas that older suns of the type display. But even out at the third orbit it provided 0-1 climate — optimum: equivalent to Earth—for the planet below.

That planet now came swinging into view as the ship's boat continued to turn. It was blue. More than ninety per cent of its surface was water, and much of the solid land was under the northern ice cap. It had been chosen as Sector Headquarters because of its unsuitability for a large population, which might resent the considerable land-area needed for Survey storage and reserve facilities.

Hardwick regarded it thoughtfully. The boat was, of course, roughly five planetary diameters out—the conventional distance to which a ship approached any planet on its own drive. Hardwick could see the ice cap very clearly, and blue sea beyond it and the twilight-line. There was one cyclonic storm just dissipating toward the night-side, and the edge of a similar cloud-system down toward the equator. Hardwick searched for Headquarters. It was on an island at about forty-five degrees latitude, which ought to be near the center of the planet's surface as seen from where the ship's boat floated. But he could not make it out. There was only the one island of any importance and it was not large.

Nothing happened. The boat's rockets remained silent. The young officer sat quietly, looking at the instruments before him. He seemed to be waiting for something to happen.

A needle kicked and stayed just off the pin. It was an external-field indicator. Some field, somewhere, now included the space in which the ship's boat floated.

"Hm-m-m." said Hardwick. "You are waiting for orders?"

"Yes, sir," said the young man. "I'm ordered not to land except under ground instructions, sir. I don't know why."

Hardwick observed detachedly:

"One of the worst wiggings I ever got was in a boat like this. I was waiting for orders and they didn't come. I acted very Service about it: stiff upper lip and all that. But I was getting in serious trouble when it occurred to me that it might be my fault I wasn't getting the orders."

The young officer glanced quickly at an instrument he had previously ignored. Then he said relievedly:

"Not this time, sir. The communicator's turned on, all right."

Hardwick said:

"Do you think they might be calling you without shifting from ship-frequency? They were talking to the ship, you know."

"I'll try, sir."

The young man leaned forward and switched to ship-band adjustment of the communicator. Different wave bands, naturally, were used between a ship and shore, and a ship and its own boats. A booming carrier wave came in instantly. The young officer hastily turned down the volume and words became distinguishable.

". . . What the devil's the matter with you? Acknowledge!"

The young officer gulped. Hardwick said mildly:

"Since he ranks you, just say 'Sorry, sir.' "

"S-sorry, sir," said Barnes into the microphone.

"Sorry?" snapped the voice from the ground. *"I've been calling for five minutes! Your skipper will hear about this! I shall—"*

Hardwick pulled the microphone before him.

"My name is Hardwick," he observed. "I am waiting for instructions to land. My pilot has been

listening on boat-frequency, as was proper. You appear to be calling us on an improper channel. Really—"

There was stricken silence. Then babbled apologies from the speaker. Hardwick smiled faintly at young Barnes.

"It's quite all right. Let's forget it now. But will you give my pilot his instructions?"

The voice said strainedly:

"You're to be brought down by landing-grid, sir. Rocket landings have been ruled non-permitted by the Sector Chief himself, sir. But we are already landing one boat, sir. Senior Officer Werner is being brought in now, sir. His boat is still two diameters out, sir, and it will take us nearly an hour to get him down without extreme discomfort, sir."

"Then we'll wait," said Hardwick. "Hm-m-m. Call us again before you start hunting us with the landing-beam. My pilot has a rather promising idea. And will you call us on the proper frequency then, please?"

The voice aground said unhappily:

"Yes, sir. Certainly, sir."

The carrier-wave hum stopped. Young Barnes said gratefully:

"Thank you, sir! Hell hath no fury like a ranking officer caught in a blunder! He'd have twisted my tail for his mistake, sir, and it could have been bad!" Then he paused. He said uneasily, "But . . . beg pardon, sir! I haven't any promising ideas. Not that I know of!"

"You have an hour to develop one," Hardwick told him.

Internally, Hardwick was disturbed. There were few occasions on which even one Senior Officer was called in to Sector Headquarters. Interstellar distances being what they were, and thirty light-speeds being practically the best available, Senior Officers necessarily acted pretty much as independent authorities. To call one man in meant all his other work had to go by the board for a matter of months. But two— And Werner?

Werner was getting to ground first. If there were something serious ashore, Werner would make a great point of arriving first, even if only by hours. A keen sort of person in giving the right impression, he'd risen in the Service faster than Hardwick. That other Lawlor field would have been his ship getting out of the way.

The young officer at his elbow fidgeted.

"Beg pardon, sir. What sort of idea should I develop, sir? I'm not sure I understand—"

"It's rather annoying to have to stay parked in free fall," said Hardwick patiently. "And it's always a good practice to review annoying situations and see if they can be bettered."

Barnes' forehead wrinkled.

"We could land much quicker on rockets, sir. And . . . even when the landing-grid reaches out for us, since we've no gravity coils, they'll have to

handle us very cautiously or they'd break our necks!"

Hardwick nodded. Barnes was thinking straight enough, but it takes young officers a long time to think of thinking straight. They have to obey so many orders unquestioningly that they tend to stop doing anything else. Yet at each rise in grade some slight trace of increased capacity to think is required. In order to reach really high rank, an officer has to be capable of thinking which simply isn't possible unless he's kept in practice on the way up.

Young Barnes looked up, startled.

"Look here, sir!" he said, surprised. "If it takes them an hour to let down Senior Officer Werner from two planetary diameters, it'll take much longer to let us down from out here!"

"True," said Hardwick.

"And you don't want to spend three hours descending, sir, after waiting an hour for him!"

"I don't," admitted Hardwick. He could have given orders, of course. But if a junior officer were spurred to the practice of thinking, it might mean that some day he'd be a better senior officer. And Hardwick knew how desperately few men were really adequate for high authority. Anything that could be done to increase the number—

Young Barnes blinked.

"But it doesn't matter to the landing-grid how far out we are!" he said in an astonished voice. "They could lock on to us at ten diameters, or at one! Once they lock the field-focus on us, when they move it they move us!"

Hardwick nodded again.

"So . . . so by the time they've got that other boat landed . . . why . . . I can use rockets and get down to one diameter myself, sir! And they can lock onto us there and let us down a few thousand miles only! So we can get to ground half an hour after the other boat's down instead of four hours from now."

"Just so," agreed Hardwick. "At a cost of a little thought and a little fuel. You do have a promising idea after all, lieutenant. Suppose you carry it out?"

Young Barnes glanced at Hardwick's safety-strap. He threw over the fuel-ready lever and conscientiously waited the conventional few seconds for the first molecules of fuel to be catalyzed cold. Once firing started, they'd be warmed to detonation-readiness in the last few millimeters of the injection-gap.

"Firing, sir," he said respectfully.

There was the curious sound of a rocket blasting in emptiness, when the sound is conveyed only by the rocket-tube's metal. There was the smooth, pushing sensation of acceleration. The tiny ship's boat swung and aimed down at the planet. Lieutenant Barnes leaned forward and punched the ship's computer.

"I hope you'll excuse me, sir," he said awkwardly. "I should have thought that out myself, sir, without prompting. But problems like this don't turn up very often, sir. As a

rule it's wisest to follow precedents as if they were orders."

Hardwick said dryly:

"To be sure! But one reason for the existence of junior officers is the fact that some day there will have to be new senior ones."

Barnes considered. Then he said surprisedly:

"I never thought of it that way, sir. Thank you."

He continued to punch the computer keys, frowning. Hardwick relaxed in his seat, held there by the gentle acceleration and the belt. He'd had nothing by which to judge the reason for his summoning to Headquarters. He had very little now. But there was trouble of some sort below. Two senior officers dragged from their own work. Werner, now— Hardwick preferred not to estimate Werner. He disliked the man, and would be biased. But he was able, though definitely on the make. And there was himself. They'd been called to Headquarters where no ship was to be landed by landing-grid, nor any rocket to come to ground. A landing-grid could pluck a ship out of space ten planet-diameters out, and draw it with gentle violence shoreward, and land it lightly as a feather. A landing-grid could take the heaviest, loaded freighter and stop it in orbit and bring it down at eight gravities. But the one below wouldn't land even a tiny Survey ship! And a landing-boat was forbidden to come down on its rockets!

Hardwick arranged those items in his mind. He knew the planet below, of course. When he got his Senior rating he'd spent six months at Headquarters learning procedures and practices proper to his increased authority. There was one inhabitable island, two hundred miles long and possibly forty wide. There was no other usable ground outside the Arctic.

The one occupied island had gigantic sheer cliffs on its windward side, where a great slab of bedrock had split along some submarine fault and tilted upward above the surface. Those cliffs were four thousand feet high, but from them the island sloped very, very gently and very gradually until its leeward shore slipped under the restless sea.

Sector Headquarters had been placed here because it seemed that civilians would not want to colonize so limited a world. But there were civilians, because there was Headquarters. And now every inch of ground was cultivated and there was irrigation and intensive farming and some hydroponic establishments. But Sector Headquarters included a vast reserve area on which a space-fleet might be marshaled in case of need. The overcrowded civilians were bitter because of the great uncultivated area the Survey needed for storage and possible emergency use. Even when Hardwick was here, years back, there was bitterness because the Survey crowded the civilian economy which had been based on it.

Hardwick considered all these items. He came to an uncomfortable

conclusion. Presently he looked up. The planet loomed larger. Much larger.

"I think you'd better lose all planetward velocity before we hook on," he observed. "The landing-grid crew might have trouble focusing on us so close if we're moving."

"Yes, sir," said the young officer. "I will, sir."

"There's some sort of merry hell below," said Hardwick wryly. 'It looks bad that they won't let a ship come down by grid. It looks worse that they won't let this one land on its rockets." He paused. "I doubt they'll risk lifting us off again."

Young Barnes finished his computations. He looked satisfied. He glanced at the now-gigantic planet below. He deftly adjusted the course of the tiny boat. Then he jerked his head around.

"Excuse me, sir. Did you say we mightn't be able to lift off again?"

"I could almost predict that we won't," said Hardwick.

"Would you . . . could you say why, sir?"

"They don't want landings. The trouble is here. If they don't want landings, they won't want launchings. Werner and I were sent for, so presumably we're needed. But apparently there's uneasiness about even our landing. Surely they won't send us off again. I suspect—"

The loud-speaker said tinnily:

"Calling boat from landing-grid! Calling boat from landing-grid!"

"Come in," said Barnes. But he looked uneasily at Hardwick.

"Correct your course!" commanded the voice sharply. *"You are not to land on rockets under any circumstances! This is an order from the Sector Chief himself! Stand off! We will be ready to lock on and land you gently in about fifteen minutes. But meanwhile stand off!"*

"Yes, sir," said young Barnes.

Hardwick reached over and took the microphone.

"Hardwick speaking," he said. "I'd like information. What's the trouble down there that we can't use our rockets?"

"Rockets are noisy, sir. Even boat-rockets. We have orders to prevent all physical vibration possible, sir. But I am ordered not to give details on a transmitter, sir."

"I'll sign off," said Hardwick, dryly.

He pushed the microphone away. He deplored his own lack of aggressiveness. Werner, now, would have pulled his rank and insisted on being informed. But Hardwick couldn't help believing that there was a reason for orders that overruled his own.

The young officer swung the rocket end-for-end. The sensation of pressure against the back of Hardwick's seat increased.

Minutes later the speaker said:

"Grid to boat. Prepare for lock-on."

"Ready, sir," said Barnes.

The small boat shuddered and leaped crazily. It spun. It oscillated

violently through seconds-long arcs in emptiness. Very, very gradually, the oscillations died. There was a momentary sensation of the faint tugging of planetary weight, which is somehow subtly different from the feel of artificial gravity. Then the cosmos turned upside down as the boat was drawn very swiftly toward the watery planet below it.

Some minutes later, young Barnes spoke apologetically:

"Beg pardon, sir," he said diffidently. "I must be stupid, sir, but I can't imagine any reason why vibrations or noise should make any difference on a planet. How could it do harm?"

"This is an ocean-planet," said Hardwick. "It might make people drown."

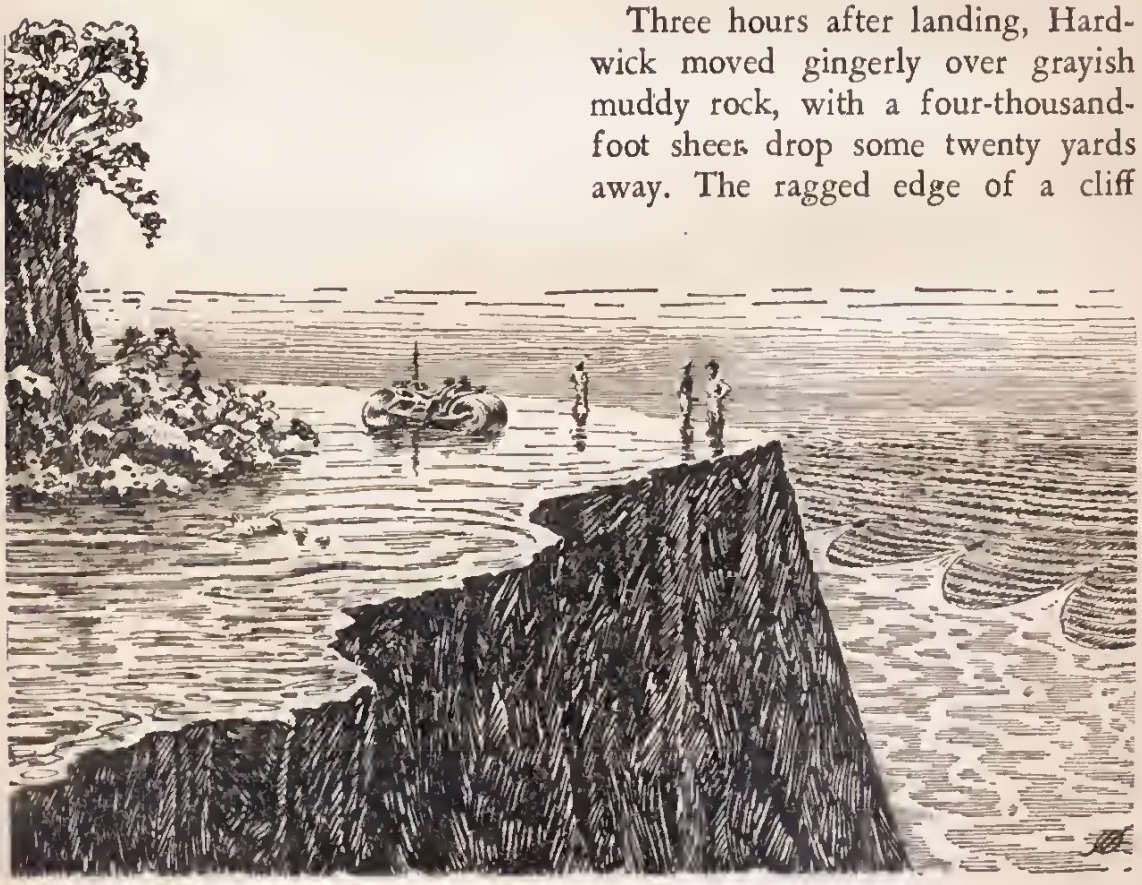
The young officer flushed. He turned his head away. And Hardwick reflected ruefully that the young were always sensitive. But he did not speak again. When they landed in the vast, spidery landing-grid—a vast metal grid-work a full half-mile high—Barnes would find out whether he was right or not.

He did. And Hardwick was right. The people on Canna III were anxious to avoid vibrations because they were afraid of drowning.

Their fears seemed to be rather well-founded.

II

Three hours after landing, Hardwick moved gingerly over grayish muddy rock, with a four-thousand-foot sheer drop some twenty yards away. The ragged edge of a cliff



fell straight down for the better part of a mile. Far below, the sea rippled gently. Hardwick saw a long, long line of boats moving slowly out to sea. They towed something between them which reached from boat to boat in exaggerated catenary curves. The boats moved in line abreast straight out from the cliffs, towing this floating, curved thing between them.

Hardwick regarded them for a moment and then inspected the grayish mud underfoot. He lifted his eyes to the inland side of this peculiar stretch of mountainside muddiness. There was a mast on the rock not far away. It held up what looked like a vision camera.

Young Barnes said:

"Excuse me, sir. What are those boats doing?"

"They're towing an oil-slick out to sea," said Hardwick absently, "by towing a floating line of some sort between them. There isn't enough oil to maintain the slick, and it's blown landward. So they tow it out to sea again. It holds down the seas. Every time, of course, they lose some of it."

"But—"

"There are trade winds," said Hardwick, not looking to seaward at all. "They always blow in the same direction, nearly. They blow three-quarters of the way around the planet, and they build up seas as they blow. Normally, the swells that pound against this cliff, here, will be a hundred feet and more from crest to crest. They'll throw spray ten times that high, of course, and once when I was here before, spray came over the cliff-top. The impacts of the waves are—heavy. In a storm, if you put your ear to the ground on the leeward shore, you can hear the waves smash against these cliffs. It's vibration."

Barnes looked uneasily at the cliff's edge and the line of boats pushing sturdily over an ocean whose waves seemed less than ripples from nearly a mile above them. But the line of boats was incredibly long. It was twenty miles in length at the least, and between each two boats there was the long curved line of something being towed on the surface.

"The . . . slick holds down the waves," Barnes guessed. "It . . . works best in deep water, I believe. The ancients knew it. Oil on the waters." He considered. "Working hard to prevent vibrations! Are they really so dangerous, sir?"

Hardwick nodded inland. And, at a quarter-mile from the edge of the cliff there was a peculiar, broken, riven rampart of soil. It might have been forty feet high, once. Now it was shattered and cracked. It had the quite incredible look of having been pulled away from where Hardwick stood, and of having partly disintegrated as it was withdrawn. There were vertical breaks in its edges. There were broken-off masses left behind. At one place a clump of perhaps a quarter-acre had not followed the rest, and trees leaned drunkenly from its top, and at the

edge had fallen outward. And all along the top of the stone cliff for as far as the eye could see there was this singular retreat of soil and vegetation from the cliff's edge.

Hardwick stooped and picked up a bit of the mud underfoot. He rubbed it between his fingers. It yielded like modeling clay. He dipped a finger into a gray, greasy-seeming puddle. He looked at the thick liquid on his finger and then rubbed it against his other palm. Young Barnes duplicated this last action.

"It . . . feels soapy, sir!" he said blankly. "Like . . . wet soap!"

"Yes," said Hardwick. "That's the first problem here."

He turned to a ground-service Survey private. He jerked his head along the coast line.

"How much have other places slipped?"

"Anywhere from this much, sir," said the private, "to two miles and upward. There's one place where it's moving at a regular rate. Four inches an hour, sir. It was three-and-a-half yesterday."

Hardwick nodded.

"Hm-m-m. We'll go back to Headquarters. Nasty business!"

He plodded over the extraordinarily messy footing toward the vehicle which had brought him here. It was not an ordinary ground-car. Instead of tires or caterwheels, it rolled upon flaccid, partly-inflated five-foot rollers. They would be completely unaffected by roughness or slipperiness of terrain, and if the vehicle fell overboard it would float. But it was thickly coated with the gray mud of this cliff-top.

As he moved along, Hardwick was able to see the pattern of the rock underneath the mud. It was curiously contorted, like something that had curdled rather than cooled. And, as a matter of fact, it was believed to have solidified slowly under water at such monstrous pressure that even molten rock could not make it burst into steam. But it was above-water now.

Hardwick climbed into the vehicle, and Barnes followed him. The bolster-truck turned. It moved toward the broken barrier of earth. Its five-foot flabby rollers seemed rather to flow over than to surmount obstacles. Great lumps of drier dirt dented them and did not disintegrate. There were no stones.

Hardwick frowned to himself. The bolster-truck more or less flowed up the crumbling, inexplicably drawing-back mass of soil. Atop it, things looked almost normal. Almost. There was a highway leading away from the cliff. At first glance it seemed perfect. But it was cracked down the middle for a hundred yards, and then the crack meandered off to the side and was gone. There was a great tree, which leaned drunkenly. A mile along the roadway its surface buckled as if something had pressed irresistibly upward from below. The truck rolled over the break.

It was notable that the motion of the truck was utterly smooth. It

made no vibration at all. But even so it slowed before it moved through a place where houses—dwellings and a shop or two—clustered closely together on each side of the road.

There were people in and about the houses, but they were doing nothing at all. Some of them stared hostilely at the Survey truck. Some others deliberately turned their backs to it. There were vehicles out of shelter and ready to be used, but none was moving. All—very oddly—were pointed in the direction from which the bolster-truck had come.

The truck went on. Presently the extraordinary flatness of the landscape became apparent. It was possible to see a seemingly illimitable distance. The ocean forty miles away showed as a thread of blue beneath the horizon. The island was an almost perfectly plane surface. But the windward side was tilted up to a height of four thousand feet above the sea, and the downwind side slipped gently beneath the waves. There was no hill visible anywhere. No mountains. No valleys save the extremely minor gullies worn by rain. Even they had been filled in, or dammed, and tied in to irrigation systems.

There was a place where there was a row of trees along such a watercourse. Half the row was fallen, and a part of the rest was tilted. The remainder stood upright and firm. All the vegetation was perfectly familiar. Most colonies have some vegetation, at least, directly descended from the mother planet Earth. But this island on Canna III had been above-water perhaps no more than three or four thousand years. There had been no time for local vegetation to develop. When the Survey took it over, there was only tidal seaweed, only one variety of which had been able to extend itself in weblike fashion over the soil above water. Terrestrial plants had wiped it out, and everything was green, and everything was human-introduced.

But there was something wrong with the ground. At this place the top of the soil bulged, and tall cornplants grew extravagantly in different directions. There, there was a narrow, lipless gas in the ground's surface. An irrigation-ditch poured water into it. It was not filled.

Barnes said distressedly:

"Excuse me, sir, but how the devil did this happen?"

"There's been irrigation," said Hardwick patiently. "The soil here was all ocean-bottom, once—it used to be what is called globigerinous ooze. There's no sand. There are no stones. There's only bedrock and formerly abyssal mud. And—some of it underneath is no longer former. It's globigerinous ooze again."

He waved his hand at the landscape. It had been remarkably tidy, once. Every square foot of ground had been cultivated. The highways were of limited width, and the houses were neat and trim. It was, perhaps, the most completely civilized landscape in the galaxy. But Hardwick added:

"You said the stuff felt like soap. In a way it's acting like soap. It lies on slightly s l a n t i n g, effectively smooth rock, like a soap-cake on a slightly slanting sheet of metal. And that's the trouble. So long as a cake of soap is dry on the bottom it doesn't move. Even if you pour water on top, like rain, the top will wet, and the water will flow off, but the bottom won't wet until all the soap is dissolved away. While that was the process here, everything was all right. But they've been irrigating."

They passed a row of neat cottages facing the road. One had collapsed completely. The others looked absolutely normal. The bolster-truck went on.

Hardwick said, frowning:

"They wanted the water to go into the soil. So they arranged it. A little of that did no harm. Plants growing dried it out again. One tree evaporates thousands of gallons a day in a good trade wind. There were some landslides in the early days, especially when storm-swells pounded the cliffs, but on the whole the ground was more firmly anchored when first cultivated than it had been before the colonists came."

"But—irrigation? The sea's not fresh, is it?"

"Water-freshening plants," said Hardwick dryly. "Ion-exchange systems. They installed them and had all the fresh water they could wish for. And they wished for a lot. They deep-plowed, so the water would sink in. They dammed the watercourses—and it sank in. What they did amounted to something like boring holes in the cake of soap I used for an illustration just now. Water went right down to the bottom. What would happen then?"

Barnes said:

"Why . . . the bottom would wet . . . and slide! As if it were greased!"

"Not greased," corrected Hardwick. "Soaped. Soap is viscous. That is different—and a lucky difference! But the least vibration would encourage movement. And it does. It has. So the population is now walking on eggs. Worse, it's walking on the equivalent of a cake of soap which is getting wetter and wetter on the bottom. It's already sliding as a viscous substance does—reluctantly. But in spite of the oil-slick they're trying to keep in place upwind there's still some battering from the sea. There are still some vibrations in the bedrock. And so there's a slow, and gentle, and gradual sliding."

"And they figure," said Barnes abruptly, "that locking onto a ship with the landing-grid might be like an earthquake." He stopped. "An earthquake, now—"

"Not much vulcanism on this planet," Hardwick told him. "But of course there are tectonic quakes occasionally. They made this island."

Barnes said uneasily:

"I don't think, sir, that I'd sleep well if I lived here."

"You are living here for the moment. But at your age I think you'll sleep."

The bolster-truck turned, following the highway. The road was very even, and the motion of the truck along it was infinitely smooth. Its lack of vibration explained why it was permitted to move when all other vehicles were stopped. But Hardwick reflected uneasily that this did not account for the orders of the Sector Chief forbidding the rocket-landing of a ship's boat. It was true enough that the living-surface of the island rested upon slanting stone, and that if the bottom were wet enough it could slide off into the sea. It already had moved. At least one place was moving at four inches per hour. But that was viscous flow. It would be enhanced by vibration, and assuredly the hammering of seas upon the windward cliff should be lessened by any possible means.

But it did not mean that the sound of a rocket-landing would be disastrous, nor that the straining of a landing-grid as it stopped a spaceship in orbit and drew it to ground should produce a landslide. There was something else—though the situation for the island's civilian population was assuredly serious enough. If any really massive movement of the ground did begin, viscous or any other; if any considerable part of the island's surface did begin to move—all of it would go. And the population would go with it. If there were survivors, they could be numbered in dozens.

The tall tamped-earth wall of the Headquarters reserve area loomed ahead. Sector Headquarters had been established here when there were no other inhabitants. Seeds had been broadcast and trees planted while the survey buildings were under construction. Headquarters, in fact, had been built upon an uninhabited planet. But colonists followed in the wake of Survey personnel. Wives and children, and then storekeepers and agriculturists, and presently civilian technicians and ultimately even politicians arrived as the non-Service population grew. Now Sector Headquarters was resented because it occupied one fourth of the island. It kept too much of the planet's useful surface out of civilian use. And the island was now desperately overcrowded.

But it seemed also to be doomed.

As the bolster-truck moved silently toward Headquarters, a hundred-yard section of the wall collapsed. There was an upsurging of dust. There was a rumbling of falling, hardened wall. The truck's driver turned white. A civilian beside the road faced the wall and wrung his hands, and stood waiting to feel the ground under his feet begin to sweep smoothly toward the here-distant sea. A post held up a traffic signal some twenty yards from the gate. It leaned slowly. At a forty-five-degree tilt it checked and hung stationary. Fifty yards from the gate, a new crack appeared across the road.

But nothing more happened. Nothing. Yet one could not be sure that some critical point had not been passed, so that from now on there would be a gradual rise in the creep-

ing of the soil toward the ocean.

Barnes caught his breath.

"That—makes one feel queer," he said unsteadily. "A . . . shock like that wall falling could start everything off!"

Hardwick said nothing at all. It had occurred to him that there was no irrigation of the Survey area. He frowned very thoughtfully—even worriedly, as the truck went inside the Headquarters gate and rolled smoothly on over a winding road through definitely parklike surroundings.

It stopped before the building which was the Sector Chief's own headquarters in Headquarters. A large brown dog dozed peacefully on the plastic-tiled landing at the top of half a dozen steps. When Hardwick got out of the truck the dog got up with a leisurely air. When Hardwick ascended the steps, with Barnes following him, the dog came forward with a sort of stately courtesy to do the honors. Hardwick said:

"Nice dog, that."

He went inside. The dog sedately followed. The interior of the building was singularly empty. There was a sort of resonant silence until somewhere a telewriter began to click.

"Come along," said Hardwick. "The Sector Chief's office is over this way."

Young Barnes followed uncomfortably.

"It seems odd there's no one around. No secretaries, no sentries, nobody at all."

"Why should there be?" asked Hardwick in surprise. "The guards at the gate keep civilians out. And nobody in the Service will bother the Chief without reason. At least, not more than once!"

But across a glistening, empty floor there ran an ominous crack.

They went down a corridor. Voices sounded, and Hardwick tracked them, with the paws of the dog clicking on the floor behind him. He led the way into a spacious, comfortably nondescript room with high windows—doors, really—that opened on green lawn outside. The Sector Chief, Sandringham, leaned placidly back in a chair, smoking. Werner, the other summoned Senior Officer, sat bolt upright in a chair facing him. Sandringham waved a hand cordially to Hardwick.

"Back so soon? You're ahead of schedule on all counts! Here's Werner, back from looking at the fuel-store situation."

Hardwick suddenly looked as if he'd been jolted. But he nodded, and Werner tried to smile and failed. He was completely white.

"My pilot from the ship, who's kept aground," said Hardwick. "Lieutenant Barnes. Very promising young officer. Cut my landing-time by hours. Lieutenant, this is Sector Chief Sandringham and Mr. Werner."

"Have a seat, Hardwick," grunted the Chief. "You, too, lieutenant. How does it look up on the cliff, Hardwick?"

"I suspect you know as well as

I do," said Hardwick. "I think I saw a vision-camera planted up there."

"True enough. But there's nothing like on-the-spot inspection. Now you're back, how does it look to you?"

"Inadequate," said Hardwick with some dryness. "Inadequate to explain some things I've noticed. But it's a very bad situation. Its degree of badness depends on the viscosity of the mud at bedrock all over the island. The left-behind mud's like pea soup. It looks really bad! But what's the viscosity at bedrock with soil pressing down—and I hope drier soil than at the bottom?"

Sandringham grunted.

"Good question. I sent for you, Hardwick, when it began to look bad, before the ground really started sliding. When I thought it might begin any time. The viscosity averages pretty closely at three times ten to the sixth. Which still gives us some leeway. But not enough."

"Not nearly enough!" said Hardwick impatiently. "Irrigation should have been stopped a long while back!"

The Sector Chief grimaced.

"I've no authority over civilians. They've their own planetary government. And do you remember?" He quoted: "'Civilian establishments and governments may be advised by Colonial Survey officials, and may make requests of them, but in each case such advice or request is to be considered on its own merits only, and in no case can it be the subject of a *quid-pro-quo* agreement.'" He added grimly: "That means you can't threaten. It's been thrown at my head every time I've asked them to cut down their irrigation in the past fifteen years! I advised them not to irrigate at all, and they couldn't see it. It would increase the food-supply, and they needed more food. So they went ahead. They built two new sea-water freshening plants only last year!"

Werner licked his lips. He said in a voice that was higher-pitched than Hardwick remembered:

"What's happening serves them right! It serves them right!"

Hardwick waited.

"Now," said Sandringham, "they are demanding to be let into Sector Headquarters for safety. They say we haven't irrigated, so the ground we occupy isn't going to slide. They demand that we take them all in here to sit on their rumps until the rest of the island slides into the sea or doesn't. If it doesn't, they want to wait here until the soil becomes stable again because they've quit irrigating."

"It'd serve them right if we let them in!" cried Werner in shrill anger. "It's their fault that they're in this fix!"

Sandringham waved his hand.

"Administering abstract justice isn't my job. I imagine it's handled in more competent quarters. I have only to meet the objective situation. Which"—he paused—"is plenty! Hardwick, you've handled swamp-planet situations. What can be done

to stop the sliding of the island's soil before it all goes overboard?"

"Not much, offhand," said Hardwick. "Give me time and I'll manage something. But a really bad storm, with high seas and plenty of rain, might wipe out the whole civilian colony. That viscosity figure is close to hopeless—if not quite."

The Sector Chief looked impassive.

"How much time does he have, Werner?"

"None!" said Werner shrilly. "The only possible thing is to try to move as many people as possible to the solid ground in the Arctic! The boats can be crowded—the situation demands it! And if the two spacecraft in orbit are sent to collect a fleet, and as many people as possible are moved at once—there may be some survivors!"

Hardwick spread out his hands.

"I'm wondering," he observed, "what the really serious problem is. There's more than sliding soil the matter! Else you would . . . I'm sure Lieutenant Barnes has thought of this . . . let the civilian population into Headquarters to sit on its rump and wait for better times."

Sandringham glanced at young Barnes, who flushed hotly at being noticed.

"I'm sure you have good reasons, sir," he said embarrassedly.

"I have several," said the Sector Chief dryly. "For one thing, so long as we refuse to let them in, they're reassured. They can't imagine we'd let them down. But if we invited them in they'd panic and fight to get in first. There'd be a full-scale slaughter right there! They'd be sure disaster was only minutes off. Which it would be!"

He paused and glanced from one to the other of the senior officers.

"When I sent for you," he said wryly, "I meant for you, Hardwick, to take care of the possible sliding. I meant for Werner, here, to do the public-relations job of scaring the civilians just enough to make them let it be done. It's not so simple, now!"

He drew a deep breath.

"It's pure chance that there is a Sector Headquarters. Or else it's Providence. We'll find that out later! But ten days ago it was discovered that an instrument had gone wrong over in the ship-fuel storage area. It didn't register when a tank leaked. And—a tank did leak. You know ship-fuel's harmless when it's refrigerated. You know what it's like when it's not. Dissolved in soil-moisture, it's not only catalyzed to explosive condition, but it's a hell of a corrosive, and it's eaten holes in some other tanks—and can you imagine trying to do anything about that?"

Hardwick felt a sensation of incredulous shock. Werner wrung his hands.

"If I could only find the man who made that faulty tank!" he said thickly. "He's killed all of us! All! Unless we get to solid ground in the Arctic!"

The Sector Chief said calmly:

"That's why I won't let them in,

Hardwick. Our storage tanks go down to bedrock. The leaked fuel—warmed up, now—is seeping along bedrock and eating at other tanks, besides being absorbed generally by the soil and dissolving in the groundwater. We've pulled all personnel out of all the area it could have seeped down to."

Hardwick felt slightly cold at the back of his neck.

"I suspect," he said wryly, "that they came out on tiptoe, holding their breaths, and that they were careful not to drop anything or scrape their chairs when they got up to leave. I would have! Anything, of course, could set it off. But it is bound to go anyhow! Of course! Now I see why we couldn't make a rocket-landing!"

The chilly feeling seemed to spread as he realized more fully. When ship-fuel is refrigerated during its manufacture, it is about as safe a substance as can be imagined —so long as it is kept refrigerated. It is an energy-chemical compound, of atoms bound together with forced-valence linkages. But enormous amounts of energy are required to force valences upon reluctant atoms.

When ship-fuel warms up, or is catalyzed, it goes on one step beyond the process of its manufacture. It goes on to the modification the refrigeration prevented. It changes its molecular configuration. What was stable because it was cold becomes something which is hysterically unstable because of its structure. The

touch of a feather can detonate it. A shout can set it off.

It is, indeed, burned only molecule by molecule in a ship's engines, being catalyzed to the unstable state while cold at the very spot where it is to detonate. And since the energy yielded by detonation is that of the forced bonds . . . why . . . the energy-content of ship-fuel is much greater than a merely chemical compound can contain. Ship-fuel contains a measurable fraction of the power of atomic explosive. But it is much more practical for use on board ship.

The point now was, of course, that leaked into the ground and warmed . . . why . . . practically any vibratory motion will detonate it. Even dissolved, it can detonate because it is not a chemical but an energy-release action.

"A good, drumming, heavy rain," said Sandringham very calmly indeed, "which falls on this end of the island, will undoubtedly set off some scores of tons of leaked ship-fuel. And that ought to scatter and catalyze and detonate the rest. The explosion should be equivalent to at least a megaton fusion bomb." He paused, and added with irony, "Pretty situation, isn't it? If the civilians hadn't irrigated, we could evacuate Headquarters and let it blow —as it will anyhow. If the fuel hadn't leaked, we could let in the civilians until the island's soil decides what it's going to do. Either would be a nasty situation, but the combination—"

Werner said shrilly:

"Evacuation to the Arctic is the only possible answer! Some people can be saved! Some! I'll take a boat and equipment and go on ahead and get some sort of refuge ready."

There was dead silence. The brown dog, who had followed Hardwick from the outer terrace, now yawned loudly. Hardwick reached over and absent-mindedly scratched his ears. Young Barnes swallowed.

"Beg pardon, sir," he said awkwardly. "But what's the weather forecast?"

"Continued fair," said Sandringham pleasantly. "That's why I had Hardwick and Werner come down. Three heads are better than one. I've gambled their lives on their brains."

Hardwick continued thoughtfully to scratch the brown dog's ears. Werner licked his lips. Young Barnes looked from one to another of them. Then he looked back at the Sector Chief.

"Sir," he said awkwardly. "I . . . I think the odds are pretty good. Mr. Hardwick, sir— He'll manage!"

Then he flushed hotly at his own presumption in saying something consoling to a Sector Chief. It was comparable to telling him how to top off his vacuum-suit tanks.

But the Sector Chief nodded in grave approval and turned to Hardwick to hear what he had to say.

III

The leeward side of the island went very gently into the water.

From a boat offshore—say, a couple of miles out—the shoreline looked low and flat and peaceful. There were houses in view, and there were boats afloat. But they were much smaller than those that had been towing a twenty-mile-long oil-slick out to sea. These boats did not ply back and forth. Most of them seemed anchored. On some of them there was activity. Men went overboard, without splashing, and things came up from the ocean bottom and were dumped inside their hulls, and then baskets went back down into the water. At long intervals—quite long intervals—men emerged from underwater and sat on the sides of the boats and smoked with an effect of leisure.

There was sunshine, and the land was green, and a seeming of vast tranquillity hung over the whole seascape. But the small Survey-personnel recreation-boat moved in toward the shore, and the look of things changed. At a mile, a mass of green that had seemed to be trees growing down to the water's edge became a thicket of tumbled trunks and overset branches where a tree-thicket had collapsed. At half a mile the water was opaque. There were things floating in it—the roof of a house; the leaves of an ornamental shrub, with nearby its roots showing at the surface, washed clean. A child's toy bobbed past the boat. It looked horribly pathetic. There were the exotic planes and angles of three wooden steps, floating in the ripples of the great ocean.

"Ignoring the imminent explosion of the fuel store," said Hardwick dryly, "we need to find out something about what has to be done to the soil to stop its creeping. I hope you remembered, lieutenant, to ask a great many useless questions."

"Yes, sir," said Barnes. "I tried to, sir. I asked everything I could think of."

"Those boats yonder?"

Hardwick indicated a boat from which something like a wire basket splashed into the water as he gestured.

"A garden boat, sir," said Barnes. "On this side of the island the sea bottom slopes so gradually, sir, that there are sea gardens on the bottom. Shellfish from Earth do not thrive, sir, but there are edible sea plants. The gardeners cultivate them as on land, sir."

Hardwick reached overside and carefully took his twentieth sample of the sea water. He squinted, and estimated the distance to shore.

"I shall try to imagine someone wearing a diving mask and using a hoe," he said dryly. "What's the depth here?"

"We're half a mile out, sir," said Barnes promptly. "It should be about sixty feet, sir. The bottom seems to have about a three per cent grade, sir. That's the angle of repose of the mud. There's no sand to make a steeper slope possible."

"Three per cent's not bad!"

Hardwick looked pleased. He picked up one of his earlier samples and tilted it, checking the angle at

which the sediment came to rest. The bottom mud, here, was essentially the same as the soil of the land. But the soil of the island was infinitely finely-divided. In fresh water it floated practically like a colloid. In sea water, obviously, it sank because of the salinity which made suspension difficult.

"You see the point, eh?" he asked. When Barnes shook his head, Hardwick explained, "Probably for my sins I've had a good deal to do with swamp planets. The mud of a salt swamp is quite different from a fresh-water swamp. The essential trouble with the people ashore is that by their irrigation they've contrived an island-wide swamp which happens to be upside down—the mud at the bottom. So the question is, can it acquire the properties of a salt swamp instead of a fresh-water swamp without killing all the vegetation on the surface? That's why I'm after these samples. As we go inshore the water should be fresher—on a shallowing shore like this with drainage in this direction."

He gestured to the Survey private at the stern of the boat.

"Closer in, please."

Barnes said:

"Sir, motorboats are forbidden inshore. The vibrations."

Hardwick shrugged.

"We will obey the rule. I've probably samples enough. How far out do the mudflats run—at the surface?"

"About two hundred yards at the surface, sir. The mud's about the consistency of thick cream. You can see where the ripples stop, sir."

Hardwick stared. He turned his eyes away.

"Er . . . sir," said Barnes unhappily. "May I ask, sir—"

Hardwick said dryly:

"You may. But the answer's pure theory. This information will do no good at all unless all the rest of the problem we face is solved. But solving the rest of the problem will do no good if this part remains unsolved. You see?"

"Yes, sir. But . . . the others seem more . . urgent, sir."

Hardwick shrugged.

There was a shout from a nearby boat. Men were pointing ashore. Hardwick jerked his eyes to the shoreline.

A section of seemingly solid ground moved slowly toward the water. Its forefront seemed to disintegrate, and a singularly slow-moving swell moved out over the rippleless border of the sea, where mudbanks like thick cream reached the surface.

The moving mass was a good half-mile in width. Its outer edge dissolved in the sea, and the top tilted, and green vegetation leaned downwind and very deliberately subsided into the water. It was remarkably like the way an ingot of non-ferrous metal slides into the pool made by its own melting.

But the aftermath was somehow horrifying. When the tumbled soil was all dissolved—and the grass un-

dulated like a floating meadow on the water—there remained a jagged shallow gap in the land-bank. There were irregularities: vertical striations and unevennesses in the exposed, broken soil.

Hardwick snatched up glasses and put them to his eyes. The shore seemed to leap toward him. He saw the harsh outlines of the temporary cliff go soft. The bottom ceased to look like soil. It glistened. It moved outward in masses which grew rounder as they swelled. They flowed after the now-vanished fallen stuff, into the water. The topsoil was suddenly undercut. The wetter material under it flowed away, leaving a ledge which bore carefully tended flowering shrubs—Hardwick could see specks of color which were their blossoms—and a brightly-colored, small trim house in which some family had lived.

The flow-away of the deeper soil made a greater, more cavernous hollow beneath the surface. It began to collapse. The house teetered. It fell. It smashed. More soil dropped down, and more, and more.

Presently there was a depression, a sort of valley leading inland away from the sea, in what had been a rampart of green at the water's edge. It was still green, but through the glasses Hardwick could see that trees had fallen, and a white-painted fence was splintered. And there was still movement.

The movement slowed and slowed, but it was not possible to say when it stopped. In reality, it did not stop. The island's soil was still flowing into the ocean.

Barnes drew a deep breath.

"I . . . thought that was it, sir," he said shakily. "I mean . . . that the whole island would start sliding."

"The ground's a bit more water-soaked down here," Hardwick said briefly. "Inland the bottom-soil's not nearly as fluid as here. But I'd hate to have a really heavy rainfall right now!"

Barnes' mind jerked back to the Sector Chief's office.

"The drumming would set off the ship-fuel?"

"Among other things," said Hardwick. "Yes." Then he said abruptly: "How good are you at precision measurements? I've messed around on swamp planets. I know a bit too much about what I ought to find, which is not good for accuracy. Can you take these bottles and measure the rate of sedimentation and plot it against salinity?"

"Y-yes, sir. I'll try, sir."

"If we had soil-coagulants enough," said Hardwick vexedly, "we could handle that upside-down swamp the civilians have so carefully made, here. But we haven't got it! But the freshened sea water they've been irrigating with is practically mineral-free! I want to know how much mineral content in the water would keep the swamp-mud from acting like wet soap. It's entirely possible that we'd have to make the soil too salty to grow anything, in order to anchor it. But I want to know!"

Barnes said uncomfortably:

"Wouldn't you, sir . . . wouldn't you have to put the minerals in irrigation-water to get them down to the . . . the swamp?"

Hardwick grinned, very surprisingly.

"You've got promise, Barnes! Yes. I would. And it would increase the rate of slide before it stopped it. Which could be another problem. But it was good work to think of it! When we get back to Headquarters, you commandeer a laboratory and make those measurements for me."

"Yes, sir," said Barnes.

"We'll start back now," said Hardwick.

The recreation-boat obediently turned. It went out to sea until the water flowing past its hull was crystal-clear. And Hardwick seemed to relax. On the way they passed more small boats. Many of them were gardeners' boats, from which men dived with diving masks to tend or harvest the cultivated garden-patches not too far down. But many were pleasure boats, from double-hulled sailing craft intended purely for sport, to sturdy though small cabin cruisers which could venture far out to sea, or even around to the windward of the island for sport-fishing. All the pleasure craft were crowded —there were usually some children —and it was noticeable that on each one there were always some faces turned toward the shore.

"That," said Hardwick, "makes for emotional thinking. These people know their danger. So they've packed their children and their wives into these little cockleshells to try to save them. They're waiting offshore here to find out if they're doomed regardless. I wouldn't say"—he nodded toward a delicately designed twin-hull sailer with more children than adults aboard—"I wouldn't call that a good substitute for an Ark!"

Young Barnes fidgeted. The boat turned again and went parallel to the shore toward where Headquarters land came down to the sea. The ground was firmer, there. There had been no irrigation. Lateral seepage had done some damage at the edge of the reserve, but the major part of the shoreline was unbroken, unchanged solid ground, looming above the beach. There was, of course, no sand at the edge of the water. There had been no weathering of rock to produce it. When this island was upraised, its coating of hardened ooze protected the stone. The small lee-side waves merely lapped upon bare, curdled rock. The wharf for pleasure boats went out on metal pilings into deep water.

"Excuse me, sir," said young Barnes embarrassedly, "but . . . if the fuel blows, it'll be pretty bad, sir."

"That's the understatement of the century," Hardwick commented. "Yes. It will. Why?"

"You've something in mind, sir, to try to save the rest of the island. Nobody else seems to know what to do. If . . . if I may say so, sir, your . . . safety is pretty important.

And you could do your work on the cliffs, sir, and . . . if I could stay at Headquarters and—"

He stopped, appalled at his own presumption in suggesting that he could substitute for a Senior Officer even as a message-boy, and even for his convenience or safety. He began to stammer:

"I m-mean, sir, n-not that I'm capable of it, sir—"

"Stop stammering," grunted Hardwick. "There aren't two separate problems. There's one which is the compound of the two. I'm staying at Headquarters to try something on the ship-fuel side, and Werner will specialize on the rest of the island since he hasn't come up with anything but shifting people to the ice pack. And the situation isn't hopeless! If there's an earthquake or a storm, of course we'll be wiped out. But short of one of those calamities, we can save part of the island. I don't know how much, but some. You make those measurements. If you're doubtful, get a Headquarters man to duplicate them. Then give me both sets."

"Y-yes, sir," said Young Barnes, miserably.

"And," said Hardwick formidably. "Never try to push your ranking officer into a safe place, even if you're willing to take his risk! Would you like it if a man under you tried to put you in a safe place while he took the chance that was yours?"

"N-no, sir!" admitted the very junior lieutenant. "But—"

"Make those measurements!" snapped Hardwick.

The boat came into the dock. Hardwick got out of the boat. He went to Sandringham's office.

Sandringham was in the act of listening to somebody in the phone-screen, who apparently was on the thin edge of hysteria. The brown dog was sprawled asleep on the rug.

When the man in the vision-screen panted to a stop, Sandringham said calmly:

"I am assured that before the soil of the island is too far gone, measures now in preparation will be applied to good effect. A Senior Survey Officer is now preparing remedial measures. He is a . . . ah . . . specialist in problems of exactly this nature."

"But we can't wait!" panted the civilian fiercely. *"I'll proclaim a planetary emergency! We'll take over the reserve area by force! We have to—"*

"If you try," Sandringham told him grimly, "I'll mount paralysis-guns to stop you!" He said with icy precision: "I urged the planetary government to go easy on this irrigation! You yourself denounced me in the Planetary Council for trying to interfere in civilian affairs! Now you want to interfere in Survey affairs! I resent it as much as you did, and with much better reason!"

"Murderer!" panted the civilian. *"Murderer!"*

Sandringham snapped off the

phone-screen. He swung his chair and nodded to Hardwick.

"That was the planetary president," he said dryly.

Hardwick sat down. The brown dog blinked his eyes open and then got up and shook himself.

"I'm holding off those idiots!" said the Sector Chief in suppressed fury. "I daren't tell him it's more dangerous here than outside! If or when that fuel blows— Do you realize that the falling of a single tree limb might set off an explosion in the Reserve-area here that would— But you know."

"Yes," admitted Hardwick.

He did know. Even forty tons of ship-fuel going off would destroy this entire end of the island. It would be at least the equivalent of a megaton fusion bomb explosion. And almost certainly the concussion would produce violent movement of the rest of the island's surface. But he was uncomfortable about putting forward his own ideas. He was not a good salesman. He suspected his own opinions until he had proved them

with extremely painstaking care—for fear of having them adopted on his past record rather than because they were sound. And then, too, his plan involved junior ranks being informed about the proposal. If they accepted a dubious plan on high authority, and the plan miscarried, it made them share in the mistake. Which hurt their self-confidence. Young Barnes, now, would undoubtedly obey any order and accept any hint blindly, and Hardwick honestly did not know why. But as a matter of the training of junior ranks—

"About the work to be done," said Hardwick. "I imagine the sea water freshening plants have closed down?"

"They have!" said Sandringham curtly. "They insisted on piling them up over my protests. Now if anybody proposed operating one, they'd scream to high heaven!"

Hardwick felt uncomfortable.

"What was done with the minerals taken out of the sea water?"

"You know how the fresheners work!" said Sandringham. "They pump sea water in at one end, and at the other, one pipe yields fresh water, and another heavy brine. They dump the heavy brine back overboard and the fresh water's pumped up and distributed through the irrigation systems."

"It's too bad some of the salts weren't stored," said Hardwick. "Could a freshener be started up again?"

Sandringham said with irony:

"Oh, the civilians would love that! No! If any man started up a water-freshener, the civilians would kill him and smash it!"

"But I think we'll need one. We'll want to irrigate some ground up here."

"My God! What for?" demanded Sandringham. Then he said shortly: "No! Don't tell me! Let me try to work it out."

There was silence. The brown dog blinked at Hardwick. He held out his hand. The dog came sedately to him and bent his head to be scratched. Hardwick scratched.

After a considerable time, the Sector Chief growled:

"I give up. Do you want to tell me?"

Hardwick said painstakingly:

"In a sense, the trouble here is that there's a swamp underground, made by irrigation. It slides. It's really a swamp upside down. On Soris II we had a very odd problem, only the swamp was right-side-up there. We'd several hundred square miles of swamp that could be used if we could drain it. We built a soil-dam around it. You know the trick. You bore two rows of holes twenty feet apart, and put soil-coagulant in them. It's an old, old device. They used it a couple of hundred years ago back on Earth. The coagulant seeps out in all directions and . . . well . . . coagulates the dirt. Makes it water-tight. It swells with water and fills the space between the soil-particles. In a week

or two there's a water-tight barrier, made of soil, going down to bedrock. You might call it a coffer-dam. No water can seep through. On Soris II we knew that if we could get the water out of the mud inside this coffer-dam, we'd have cultivable ground."

Sandringham said skeptically:

"But it called for ten years' pumping, eh? When mud doesn't move, pumping isn't easy!"

"We wanted the soil," said Hardwick. "And we didn't have ten years. The Soris II colony was supposed to relieve population-pressure on another planet. The pressure was terrific. We had to be ready to receive some colonists in eight months. We had to get the water out quicker than it could be pumped. And there was another problem mixed up with it. The swamp vegetation was pretty deadly. It had to be gotten rid of, too. So we made the dam and . . . well . . . took certain measures and then we irrigated it. With water from a nearby river. It was very ticklish. But we had dry ground in four months, with the swamp-vegetation killed and turning back to humus."

"I ought to read your reports," said Sandringham dourly. "I'm too busy, ordinarily. But I should read them. How'd you get rid of the water?"

Hardwick told him. He felt uncomfortable about it. The telling required eighteen words.

"Of course," he added, "we did pick a day when there was a strong wind from the right quarter."

Sandringham stared at him. Then he said vexedly:

"But how does that apply here? It was sound enough, though I'd never have thought of it. But what's it got to do with the situation here?"

"This . . . swamp, you might say," said Hardwick, "is underground. But there's forty feet, on an average, of soil on top."

He explained painstakingly what difference that made. It took him three sentences to make the difference clear.

Sandringham leaned back in his chair. Hardwick scratched the dog, somewhat embarrassed. Sandringham thought concentratedly.

"I do not see any possible chance," said Sandringham distastefully, "of doing it any other way. I would never have thought of that! But at least ninety per cent of the people on this island, Civilian and Survey together, will die if we don't do something. So we will do this. But I'm taking it out of your hands, Hardwick."

Hardwick said nothing. He waited.

"Because," said Sandringham, "you're not the man to put over to the civilians what they must believe. You're not impressive. I know you, and I know you're a good man in a pinch. But this pinch needs a salesman. So I'm going to have Werner make the . . . er . . . pitch to the planetary government. Results are

more important than justice, so Werner will front this affair."

Hardwick winced a little. But Sandringham was right. He didn't know how to be impressive. He could not speak with pompous conviction, which is so much more convincing than reason, to most people. He wasn't the man to get the co-operation of the non-Service population, because he could only explain what he knew and believed, and was not practiced in persuasion. But Werner was. He had the knack of making people believe anything, not because it was reasonable but because it was oratory.

"I suppose you're right," acknowledged Hardwick. "We need civilian help and a lot of it. I'm not the man to get it. He is." He did not say anything about Werner being the man to get credit, whether he deserved it or not. He patted the dog's head and stood up. "I wish I had a good supply of soil-coagulant. I need to make a coffer-dam in the reserve area here. But I think I'll manage."

Sandringham regarded him soberly as he moved to the door. As he was about to pass out of it, Sandringham said:

"Hardwick—"

"What?"

"Take good care of yourself. Will you?"

IV

Therefore Senior Officer Werner, of the Colonial Survey, received his instructions from Sandringham. Hardwick never knew the details of the instructions Werner got. They were possibly persuasive, or they may have been menacing. But Werner ceased to argue for the movement of any fraction of the island's population to the arctic ice cap, and instead made frequent eloquent addresses to the planetary population on the scientific means by which their lives were to be saved. Between the addresses, perhaps, he sweated cold sweat when a tree sedately tilted in what had seemed solid soil, or a building settled perceptibly while he looked at it, or when . . . say . . . a section of the island's soil bulged upward.

Publicly, he headed citizens' committees, and grandly gave instructions, and spoke in unintelligible and, therefore, extremely scientific terms when desperately earnest men asked for explanations. But he was perfectly clear in what he wanted them to do.

He wanted drill-holes in the arable soil down to the depth at which the holes began to close up of themselves. He wanted those holes not more than a hundred feet apart, in lines which slanted at forty-five degrees to the gradient of the bedrock.

Sandringham checked his speeches, at the rate of four a day. Once he had Hardwick called away from where he supervised extremely improbable operations. Hardwick was smeared with the island's grayish

mud when he looked into the phone-plate to take the call.

"Hardwick," said Sandringham curtly, "Werner's saying those holes you want are to be lines at forty-five degrees to the gradient."

"That . . . I'd like a little more," said Hardwick. "A little less, rather. If they slanted three miles across the grade for every two downhill, it would be better. I'd like to put a lot more lines of holes. But there's the element of time."

"I'll have him explain that he was misquoted," said Sandringham, grimly. "Three across to two down. How close do you really want those lines?"

"It's not how close," said Hardwick. "I've got to have them quickly. How does the barometer look?"

"Down a tenth," said Sandringham.

Hardwick said:

"Damn! Has he got plenty of labor?"

"All the labor there is," said Sandringham. "And I'm having a road laid along the cliffs for speed with the trucks. If I dared . . . and if I had the pipe . . . I'd lay a pipe line."

"Later," said Hardwick tiredly. "If he's got labor to spare, set them to work turning the irrigation systems hind part before. Make them drainage systems. Use pumps. So if rain does come it won't be spread out on the land by all the pretty ditches. So it will be gathered instead and either flung back over the cliffs or else drained downhill without getting a chance to sink into the ground. For the time being, anyhow."

Sandringham said evenly:

"Has it occurred to you what a good, pounding rain would do to Headquarters, and consequently to public confidence on this island, and therefore to the attempt of anybody to do anything but wring his hands because he was doomed?"

Hardwick grimaced.

"I'm irrigating, here. I've got a small-sized lake made, and an ice coffer-dam, and the water-freshener is working around the clock. If there is labor, tell 'em to fix the irrigation systems into drainage layouts. That will cheer them, anyhow."

He was very weary, then. There is a certain exhausting quality in the need to tell other men to do work which may cause them to be killed spectacularly. The fact that one will certainly be killed with them does not lessen the tension.

He went back to his work. And it definitely seemed to be as purposeless as any man's work could possibly be. Down-grade from the now thoroughly deserted area in which ship-fuel tanks had leaked—quite far down-grade—he had commandeered all the refrigeration equipment in the warehouses. Since refrigeration was necessary for fuel-storage, there was a great deal. He had planted iron pipe in the soil, and circulated refrigerant in it, and presently there was a wall of solidly frozen earth which was shaped like a shallow U.

It was a coffer-dam. In the curved part of that U he'd siphoned out a lake. A peristaltic pump ran sea water from the island's lee out upon the ground—where it instantly turned to mud—and another peristaltic pump sucked the mud up again and delivered it down-grade beyond the line of freezing-pipes. It was in fact a system of hydraulic dredging such as is normally performed in rivers and harbors. But when topsoil is merely former abyssal mud it is an excellent way to move dirt. Also, it does not require anybody to strike blows into soil which may be explosive when one has gotten down near bedrock, and in particular there are no clanking machines.

But it was hair-raising.

In one day, though, he had a sizable lake pumped out. And he pumped it out to emptiness, painstakingly smelling the water as it went down to a greater depth below the previous ground surface. At the end of the day he shivered and ordered pumping ended for the time.

But then he had the brine-pipe laid around a great circuit, to the Headquarters ground which was upgrade from the now-deserted square mile or so in which the fuel tanks lay deep in the soil. And here, also, he performed excavation without the sound of hammer, shovel, or pick. He thrust pipes into the ground, and they had nozzles at the end which threw part of the water backward. So that when sea water poured into them it thrust them deeper into the ground by the backward jet action. Again the fact that the soil was abyssal mud made it possible. The nozzles floated up much grayish mud, but they bored ahead down to bedrock, and there they lay flat and tunneled to one side and the other—the tunnels they made being full of water at all times.

From those tunnels, as they extended, an astonishing amount of sea water seeped out into the soil near bedrock. But it was sea water. It was heavily mineralized. And it is a peculiarity of sea water that it is an electrolyte, and it is a property of electrolytes that they coagulate colloids, and rather definitely discourage the suspension of small solid particles which are on the borderline of being colloids. In fact, the water of the ocean of Canna III turned the ground-soil into good, honest mud which did not feel at all soapy, and through which it percolated with a surprising readiness.

Young Barnes eagerly supervised this part of the operation, once it was begun. He shamed the Survey personnel assigned to him into perhaps excessive self-confidence.

"He knows what he's doing," he said firmly. "Look here! I'll take that canteen. It's fresh water. Here's some soap. Wet it in fresh water and it lathers. See? It dissolves. Now try to dissolve it in sea water! Try it! See? They put salt in the boiled stuff to separate soap out, when they make it!" He'd picked up that item from Hardwick. "Sea water won't soften the ground. It can't! Come on, now, let's get another pipe put-

ting more salt water underground!"

His workmen did not understand what he was doing, but they labored zestfully because it was mysterious and for a purpose. But downhill, in the hydraulic-dredged-out lake, water came seeping in, in the form of mud. And then another pipe came up from the seashore and the mud settled solidly on the bottom, not dispersing. It was a rather small pipe, and the personnel who laid it were bewildered. Because there was a water-freshening plant down there on the shore, and all the fresh water was poured back overboard, while the brine—saturated with salts from the ocean: unable to dissolve a single grain of anything else—was being used to fill the small artificial lake.

The second day Sandringham called Hardwick again, and again Hardwick peered wearily into the phone-screen.

"Yes," said Hardwick, "the leaked fuel is turning up. In solution. I'm trying to measure the concentration by matching specific gravities of lake water and brine, and then sticking electrodes in each. The fuel's corrosive as the devil. It gives a different EMF. Higher than brine of the same density. I think I've got it in hand."

"Do you want to start shipping it?" demanded Sandringham.

"You can begin pouring it down holes," said Hardwick. "How's the barometer?"

"Down three-tenths this morning. Steady now."

"Damn!" said Hardwick. "I'll set up molds. Freeze it in plastic bags the size of the bore-holes so it will go down. While it's frozen they can even push it down deep."

Sandringham said very grimly:

"There's been more damned technical work done with ship-fuel than any other substance since time began. But remember that the stuff can still be set off, even dissolved in water! Its sensitivity goes down, but it's not gone!"

"If it were," said Hardwick drearily, "you could invite in the civilian population to sit on its rump. I've got something like forty tons of ship-fuel in brine solution in this lake I pumped out! But it's in five thousand tons of brine. We don't speak above a whisper when we're around it. We walk in carpet slippers and you never saw people so polite! We will start freezing it."

"How can you handle it?" demanded Sandringham apprehensively.

"The brine freezes at minus thirty," said Hardwick. "In one per cent solution it's only five per cent sensitive at minus nineteen. We're handling it at minus nineteen. I think I'll step up the brine and chill it a little more."

He waved a mud-smeared hand and went away.

That day, bolster-trucks began to roll out of Survey Headquarters. They rolled very, very smoothly, and they trailed a fog of chilled air behind them. And presently there were men with heavy gloves on their hands taking long things like sau-

sages out of the bolster-trucks and untying the ends and lowering them down into holes bored in the top-soil until they reached places where wetness made the holes close up again. Then the men from Survey pushed those frozen sausages underground still further by long poles with carefully padded—and refrigerated—ends. And then they went on to other holes.

The first day there were five hundred such sausages thrust down into holes in the ground, which holes to all intents and purposes closed up behind them. The second day there were four thousand. The third day there were eight. On the fourth the solution of ship-fuel in brine in the lake did not give adequate EMF in the little battery-cell designed to show how much corrosive substance there was in the brine. Hardwick took samples from the fluid draining into the lake. It was not mud any longer. Brine flowed at the top of bedrock, and it left the mud behind it, because salt water remarkably hindered the suspension of former globigerinous ooze particles. It was practically colloid. Salt water practically coagulated it.

The brine flowing from the salt-water tunnels upwind showed no more ship-fuel in it. Hardwick called Sandringham and told him.

"I can call in the civilians!" said Sandringham. "You've mopped up the leaked stuff! It couldn't have been done—"

"Not anywhere but here, with bedrock handy just underneath, and

slanting," said Hardwick. "But I wouldn't advise it. Tell them they can come if they want to. They'll sort of drift in. I want to tap some more ship-fuel for the rest of those bore-holes. From the tanks that haven't leaked."

Sandringham hesitated.

"Twenty thousand holes," said Hardwick tiredly. "Each one had a six-hundred block of frozen saturated brine dumped in it, with roughly one pound of ship-fuel in solution. You have gone that far. Might as well go the rest of the way. How's the barometer?"

"Up a tenth," said Sandringham. "Still rising."

Hardwick blinked at him, because he had trouble keeping his eyes open now.

"Let's ride it, Sandringham!"

Sandringham hesitated. Then he said:

"Go ahead."

Hardwick waved his arms at his associates, whom he admired with great fervor in his then-foggy mind, because they were always ready to work when it was needed, and it had not stopped being needed for five days running. He explained very lucidly that there were only three more miles of holes to be filled up, and therefore they would just draw so much of ship-fuel and blend it carefully with an appropriate amount of suitable chilled brine and then freeze it in appropriate sausages—

Young Lieutenant Barnes said gravely:

"Yes, sir. I'll take care of it. You remember me, sir! I'll take care of it."

Hardwick said:

"Barometer's up a tenth." His eyes did not quite focus. "All right, lieutenant. Go ahead. Promising young officer. Excellent. I'll sit down here for just a moment."

When Barnes came back, Hardwick was asleep. And a last one hundred and fifty frozen sausages of brine and ship-fuel went out of Headquarters within a matter of hours, and then a vast quietude settled down everywhere.

Young Barnes sat beside Hardwick, menacing anybody who even thought of disturbing him. When Sandringham called for him. Barnes went to the phone-plate.

"Sir," he said with vast formality. "Mr. Hardwick went five days without sleep. His job's done. I won't wake him, sir!"

Sandringham raised his eyebrows.

"You won't?"

"I won't, sir!" said young Barnes.

Sandringham nodded.

"Fortunately," he observed, "nobody's listening. You are quite right."

He snapped the connection. And then young Barnes realized that he had defied a Sector Chief, which is something distinctly more improper in a junior officer than merely trying to instruct him in topping off his vacuum-suit tanks.

Twelve hours later, however, Sandringham called for him.

"Barometer's dropping, lieutenant.

I'm concerned. I'm issuing a notice of the impending storm. Not everybody will crowd in on us, but a great many will. I'm explaining that the chemicals put into the bottom soil may not quite have finished their work. If Hardwick wakens, tell him."

"Yes, sir," said Barnes.

But he did not intend to wake Hardwick. Hardwick, however, woke of himself at the end of twenty hours of sleep. He was stiff and sore and his mouth tasted as if something had kittened in it. Fatigue can produce a hangover, too.

"How's the barometer?" he asked when his eyes came open.

"Dropping, sir. Heavy winds, sir. The Sector Chief has opened the Reserve Area, sir, to the civilians if they wish to come."

Hardwick computed dizzily on his fingers. A more complex instrument was actually needed, of course. One does not calculate on one's fingers just how long a one per cent solution of ship-fuel in frozen brine has taken to melt, and how completely it has diffused through an upside-down swamp with the pressure of forty feet of soil on top of it, and therefore its effective concentration and dispersal underground.

"I think," said Hardwick, "it's all right. By the way, did they turn the irrigation systems hind end to?"

Young Barnes did not know what this was all about. He had to send for information. Meanwhile he solicitously plied Hardwick with coffee and food. Hardwick grew reflective.

"Queer," he said. "You think of the damage forty tons of ship-fuel can do. Setting off the rest of the store and all. But even by itself it rates some thousands of tons of TNT. I wonder what TNT was, before it became a ton-measure of energy? You think of it exploding in one place, and it's appalling! But think of all that same amount of energy applied to square miles of upside-down swamp. Hundreds or thousands of miles of upside-down swamp. D'you know, lieutenant, on Soris II we pumped a ship-fuel solution onto a swamp we wanted to drain? Flooded it, and let it soak until a day came with a nice, strong, steady wind."

"Yes, sir," said Barnes respectfully.

"Then we detonated it. We didn't have a one per cent solution. It was more like a thousandth of one per cent solution. Nobody's ever measured the speed of propagation of an explosion in ship-fuel, dry. But it's been measured in dilute solution. It isn't the speed of sound. It's lower. It's purely a temperature-phenomenon. In water, at any dilution, ship-fuel goes off just barely below the boiling-point of water. It doesn't detonate from shock when it's diluted enough to be all ionized—but that takes a hell of a lot of dilution. Have you got some more coffee?"

"Yes, sir," said Barnes. "Coming up, sir."

"We floated ship-fuel solution over that swamp, Barnes, and let it stand. It has a high diffusion-rate. It

went down into the mud— And there came a day when the wind was right. I dumped a red-hot iron bar into the swamp water that had ship-fuel in solution. It was the weirdest sight you ever saw!"

Barnes served him more coffee. And Hardwick sipped it, and it burned his tongue.

"It went up in steam," he said. "The swamp water that had the ship-fuel dissolved in it. It didn't explode, as a mass. They told me later that it propagated at hundreds of feet per second only. They could see the wall of steam go marching across the swamp. Not even high-pressure steam. There was a *whoosh!* and a cloud of steam half a mile high that the wind carried away. And all the surface water in the swamp was gone, and all the swamp vegetation parboiled and dead. So"—he yawned suddenly—"we had a ten-mile by fifty-mile stretch of arable ground ready for the coming colonists."

He tried the coffee again. He added reflectively:

"That trick—it didn't explode the ship-fuel, in a way. It burned it. In water. It applied the energy of the fuel to the boiling-away of water. 'Powerful stuff! We got rid of two feet of water on an average, counting what came out of the mud. It cost . . . hm-m-m . . . a fraction of a gram per square yard."

He gulped the coffee down. There were men looking at him solicitously. They seemed very glad to see him awake again. There was a monstrous bank of cloud-stuff piling up in the sky. He suddenly blinked at that.

"Hello! How long did I sleep, Barnes?"

Barnes told him. Hardwick shook his head to clear it.

"We'll go see Sandringham," said Hardwick, heavily. "I'd like to postpone firing as long as I can, short of having the stuff start draining into the sea to leeward."

There were mud-stained men around the place where Hardwick had slept. When he went—still groggy—out to the bolster-truck young Barnes had waiting, they regarded Hardwick in a very satisfying manner. Somebody grunted, "Good to've worked with you, sir,"—which is about as much of admiration as anybody would want to hear expressed. These associates of Hardwick in the mopping-up of leaked ship's fuel would be able to brag of the job at all times and in all places hereafter.

Then the truck went trundling away in search of Sandringham.

It found him on the cliffs to the windward side of the island. The sea was no longer a cerulean blue. It was slaty-color. There were occasional flecks of white foam on the water four thousand feet below. There were dark clouds, by then covering practically all the sky. Far out to sea, there were small craft heading grimly for the ends of the island, to go around it and ride out the coming storm in its lee.

Sandringham greeted Hardwick with relief. Werner stood close by,

opening and closing his hands jerkily.

"Hardwick!" said the Sector Chief cordially. "We're having a disagreement, Werner and I. He's confident that the turning of the irrigation systems hind end to—making them surface-drainage systems, in effect—will take care of the whole situation. Adding the brine underground, he thinks, will have done a good deal more. He says it'll be bad, psychologically, for anything more to be done. He didn't speak of it, and it would injure public confidence in the Survey."

Hardwick said curtly:

"The only thing that will make a permanent difference on this island is for the water-fresheners to be a little less efficient. Barnes has the figures. He computed them from some measurements I had him make. If the water-freshener plants don't take all the sea-minerals out: if they don't make the irrigation water so infernally soft and suitable for hair-washing and the like: if they turn out hard water for irrigation, this won't happen again! But there's too much water underground now. We have got to get it out, because a little more's going underground from this storm, surface-drainage systems or no surface-drainage systems."

Sandringham pointed to leeward, where a black, thick procession of human beings trooped toward the Survey area on foot and by every possible type of vehicle.

"I've ordered them turned into the ship-sheds and warehouses," said the Sector Chief. "But of course we haven't shelter for all of them. At a guess, when they feel safe they'll go back to their homes even through the storm."

The sky to windward grew blacker and blacker. There was no longer a steady flow of wind coming over the cliff's edge. It came in gusts, now, of extreme violence. They could make a man stagger on his feet. There were more flecks of white on the ocean's surface.

"The boats," added Sandringham, "were licked. There simply wasn't enough oil to maintain the slick. The radio reports were getting hysterical before I ordered them told that we had it beaten on shore. They're running for shelter now. I think they'd have stayed out there trying to hold the slick in place with their towline, if I hadn't said we had matters in hand."

Werner said, tight-lipped: "I hope we have!"

Hardwick shrugged.

"The wind's good and strong, now," he observed. "Let's find out. You've got the starting system all set?"

Sandringham waved his hand. There was a high-voltage battery set. It was of a type designed for blasting on airless planets, but that did not matter. Its cables led snakily for a couple of hundred feet to a very small pile of grayish soil which had been taken out of a bore-hole. They went over that untidy heap and down into the ground. Hardwick took hold of the firing-handle. He paused.

"How about highways?" he asked. "There might be some steam out of this hole."

"All allowed for," said Sandringham. "Go ahead."

There was a gust of wind strong enough to knock a man down. There was a humming sound in the air, as storm-wind beat upon the four-thousand-foot cliff and poured over its top. There were gradually rising waves, below. The sky was gray. The sea was slate-colored. Far, far to windward, the white line of pouring rain upon the water came marching toward the island.

Hardwick pumped the firing-handle.

There was a pause, while wind-gusts tore at his garments and staggered him where he stood. It was quite a long pause.

Then a white vapor came seeping out of the bore-hole. It was perfectly white. Then it came out with a sudden burst which was not in any sense explosive, but was merely a vast rushing of vaporized water. Then, a hundred yards away, there was a mistiness on the grassy surface. Still farther, a crack in the surface-soil let out a curtain of white vapor.

Here and there, everywhere, little gouts of steam poured into the air and tumbled in the storm-wind. It was notable that the steam did not come out as an invisible vapor, and condense in midair. It poured out of the ground in clouds, already condensed but thrust out by more masses of vapor behind it. It was not superheated steam that came out. It was simply steam. Harmless steam, like the steam out of the spouts of tea kettles. But it rose from individual places everywhere. It made a massy coating of vapor which the storm-wind blew away. In seconds a half-mile of soil was venting steam; in seconds more a mile. The thick, fleecy vapor swept across the landscape. The storm-wind could only tumble it and sweep it away.

In minutes there was no part of the island to be seen at all, save only the thin line of the cliffs reaching away between dark water on the one hand and snow-white clouds of vapor on the other.

"It can't scald anybody, can it?" asked Barnes uneasily.

"Not," said Hardwick, "when it's had to come up through forty feet of soil. It's been pretty well cooled off in taking up some extra moisture. It spread pretty well, didn't it?"

The Sector Chief's office had tall windows—doors, really—that looked out upon green lawn and many trees. Now a downpour of rain beat down outside. Wind whipped at the trees. There was tumult and roaring and the vibration of gusts of hurricane force. Even the building in which the Sector Chief's office was, vibrated slightly in the wind.

The Sector Chief beamed. The brown dog came in uneasily, looked around the room, and walked in leisurely fashion toward Hardwick. He settled with a sigh beside Hardwick's chair.

"What I want to know," said

Werner tensely, "is, won't this rain put back all the water the ship-fuel boiled away?"

Hardwick said uncomfortably: "Two inches of rain would be a heavy fall, Sandringham tells me. It's the lack of heavy rains that made the civilians start irrigating. When you figure the energy-content of ship-fuel, Werner—an appreciable fraction of the energy in atomic explosive—it's sort of deceptive. Turn it into thermal units and it gets to be enlightening. We turned loose, underground, enough heat to boil away two feet of soil-water under the island's whole surface."

Werner said sharply:

"What'll happen when that heat passes up through the soil? It'll kill the vegetation, won't it?"

"No," said Hardwick mildly. "Because there *was* two feet of water to be turned to steam. The bottom layer of the soil was raised to the temperature of steam at a few pounds pressure. No more. The heat's already escaped. In the steam."

The phone-plate lighted. Sandringham snapped it on. A voice made a report in a highly official voice.

"Right!" said Sandringham. The highly official voice spoke again. "Right!" said Sandringham again. "You may tell the ships in orbit that they can come down now, if they don't mind getting wet." He turned. "Did you hear that, Hardwick? They have bored new cores. There are a few soggy spots, but the ground's as firm, all over the island, as it was when the Survey first came here. A very good job, Hardwick! A very good job!"

Hardwick flushed. He reached down and patted the head of the brown dog.

"Look!" said the Sector Chief. "My dog, there, has taken a liking to you. Will you accept him as a present, Hardwick?"

Hardwick grinned.

Young Barnes made ready to rejoin his ship. He was very strictly Service, very stiffly at attention. Hardwick shook hands with him.

"Nice to have had you around, lieutenant," he said warmly. "You're a very promising young officer. Sandringham knows it and has made a note of the fact. Which I suspect is going to put you to a lot of trouble. There's a devilish shortage of promising young officers. He'll give you hellish jobs to do, because he has an idea you'll do them."

"I'll try, sir," said young Barnes formally. Then he said awkwardly, "May I say something, sir? I'm very proud, sir, to have worked with you. But dammit, sir, it seems to me that something more than just saying thank you was due you! The Service, sir, ought to—"

Hardwick regarded the young man approvingly.

"When I was your age," he said, "I'd the very same attitude. But I had the only reward the Service or anything else could give me. The job got done. It's the only reward you

can expect in the Service, Barnes. You'll never get any other."

Young Barnes looked rebellious. He shook hands again.

"Besides," said Hardwick, "there is no better."

Young Barnes marched back toward his ship in the great metal crisscross of girders which was the landing grid.

Hardwick absently patted his dog. He headed back toward Sandringham's office for his orders to return to his own work.

THE END

WHAT IS A MACHINE?

The work with the psionic machines is bringing up some new problems of definition of the term "machine" or "tool." Essentially, we might say that a structure or system which aids a human being to do something, or makes it possible for him to do something which he could not do without the structure, is a *tool.*

In the class *tool* there is a subclass consisting of tools which are dynamically helpful, rather than essentially static, or simple transmitters. A shovel is a *tool;* a power shovel is a *machine.* A typewriter is a *tool,* a power operated printing press is a *machine.*

Experiments have shown that the Hieronymus machine works as well without the power supply as it does with a power supply, but does not work if a defective tube is in the socket. This appears to indicate that it is a *tool* but not a *machine.*

Note, however, that Man's first really powerful tools for aiding mental functions were the equivalents of paper-and-pencil. Today, you can do with paper and pencil, something you can *not* do without it. Further, while you can, now, multiply 26 × 7 in your head—it was practice with paper and pencil tools that aided development of that skill.

An abacus is a "machine" with which a skilled operator can beat a man using a standard electric desk-model computer—as has been demonstrated. But any scientist, if he were shown an abacus, would conclude that this was a completely functionless, nonsensical hoax of unconnected wires and beads that obviously couldn't be called a computer machine. Couldn't possibly function!

What are we seeking when we seek "a psionic machine"?

PATE DE FOIE GRAS

Your kind attention is specially invited to this Special Feature. Let's see you crack this item!

BY ISAAC ASIMOV

Illustrated by Freas

I couldn't tell you my real name if I wanted to and, under the circumstances, I don't want to.

I'm not much of a writer myself, unless you count the kind of stuff that passes muster in a scientific paper, so I'm having Isaac Asimov write this up for me.

I've picked him for several reasons. First, he's a biochemist, so he understands what I tell him; some of it, anyway. Secondly, he can write; or at least he has published considerable fiction, which may not, of course, be the same thing.

But most important of all, he can get what he writes published in science-fiction magazines and he has written two articles on thiotimoline, and that is exactly what I need for reasons that will become clear as we proceed.

I was not the first person to have the honor of meeting The Goose. That belongs to a Texas cotton-farmer named Ian Angus MacGregor, who owned it before it became government property. (The names, places and dates I use are deliberately synthetic. None of you will be able to trace anything through them. Don't bother trying.)

MacGregor apparently kept geese

about the place because they ate weeds, but not cotton. In this way, he had automatic weeders that were self-fueling and, in addition, produced eggs, down, and, at judicious intervals, roast goose.

By summer of 1955, he had sent an even dozen of letters to the Department of Agriculture requesting information on the hatching of goose eggs. The department sent him all the booklets on hand that were anywhere near the subject, but his letters simply got more impassioned and freer in their references to his "friend," the local Congressman.

My connection with this is that I am in the employ of the Department of Agriculture. I have considerable training in agricultural chemistry, plus a smattering of vertebrate physiology. (This won't help you. If you think you can pin my identity out of this, you are mistaken.)

Since I was attending a convention at San Antonio in July of 1955, my boss asked me to stop off at MacGregor's place and see what I could do to help him. We're servants of the public and besides we had finally received a letter from MacGregor's congressman.

On July 17, 1955, I met The Goose.

I met MacGregor first. He was in his fifties, a tall man with a lined face full of suspicion. I went over all the information he had been given, explained about incubators, the values of trace minerals in the diet, plus some late information on Vitamin E, the cobalamins and the use of antibiotic additives.

He shook his head. He had tried it all and still the eggs wouldn't hatch.

What could I do? I'm a Civil Service employee and not the archangel, Gabriel. I'd told him all I could and if the eggs still wouldn't hatch, they wouldn't and that was that. I asked politely if I might see his geese, just so no one could say afterward I hadn't done all I possibly could.

He said, "It's not geese, mister; it's one goose."

I said, "May I see the one goose?"

"Rather not."

"Well, then, I can't help you any further. If it's only one goose, then there's just something wrong with it. Why worry about one goose? Eat it."

I got up and reached for my hat.

He said, "Wait!" and I stood there while his lips tightened and his eyes wrinkled and he had a quiet fight with himself.

He said, "If I show you something, will you swear to keep it secret?"

He didn't seem like the type of man to rely on another's vow of secrecy, but it was as though he had reached such a pit of desperation that he had no other way out.

I said, "If it isn't anything criminal—"

"Nothing like that," he snapped.

And then I went out with him to a pen near the house, surrounded by barbed wire, with a locked gate to it,

and holding one goose—The Goose.

"That's The Goose," he said. The way he said it, I could hear the capitals.

I stared at it. It looked like any other goose, Heaven help me, fat, self-satisfied and short-tempered. I said, "Hm-m-m" in my best professional manner.

MacGregor said, "And here's one of its eggs. It's been in the incubator. Nothing happens." He produced it from a capacious overall pocket. There was a queer strain about his manner of holding it.

I frowned. There was something wrong with the egg. It was smaller and more spherical than normal.

MacGregor said, "Take it."

I reached out and took it. Or tried to. I gave it the amount of heft an egg like that ought to deserve and it just sat where it was. I had to try harder and then up it came.

Now I knew what was queer about the way MacGregor held it. It weighed nearly two pounds. (To be exact, when we weighed it later, we found its mass to be 852.6 grams.)

I stared at it as it lay there, pressing down the palm of my hand, and MacGregor grinned sourly. "Drop it," he said.

I just looked at him, so he took it out of my hand and dropped it himself.

It hit soggy. It didn't smash. There was no spray of white and yolk. It just lay where it fell with the bottom caved in.

I picked it up again. The white eggshell had shattered where the egg had struck. Pieces of it had flaked away and what shone through was a dull yellow in color.

My hands trembled. It was all I could do to make my fingers work, but I got some of the rest of the shell flaked away, and stared at the yellow.

I didn't have to run any analyses. My heart told me.

I was face to face with The Goose!

The Goose That Laid The Golden Eggs!

You don't believe me. I'm sure of that. You've got this tabbed as another thiotimoline article.

Good! I'm *counting* on your thinking that. I'll explain later.

Meanwhile, my first problem was to get MacGregor to give up that golden egg. I was almost hysterical about it. I was almost already to clobber him and make off with the egg by force if I had to.

I said, "I'll give you a receipt. I'll guarantee you payment. I'll do anything in reason. Look, Mr. MacGregor, they're no good to you anyway. You can't cash the gold unless you can explain how it came into your possession. Holding gold is illegal. And how do you expect to explain? If the government—"

"I don't want the government butting in," he said, stubbornly.

But I was twice as stubborn. I followed him about. I pleaded. I yelled. I threatened. It took me hours. Literally. In the end, I signed a receipt and he dogged me out to my

car and stood in the road as I drove away, following me with his eyes.

He never saw that egg again. Of course, he was compensated for the value of the gold—$656.47 after taxes had been subtracted—but that was a bargain for the government.

When one considers the potential value of that egg—

The *potential* value! That's the irony of it. That's the reason for this article.

The head of my section at the Department of Agriculture is Louis P. Bronstein. (Don't bother looking him up. The "P." stands for Pittfield if you want more misdirection.)

He and I are on good terms and I felt I could explain things without being placed under immediate observation. Even so, I took no chances. I had the egg with me and when I got to the tricky part, I just laid it on the desk between us.

Finally, he touched it with his finger as though it were hot.

I said, "Pick it up."

It took him a long time, but he did, and I watched him take two tries at it as I had.

I said, "It's a yellow metal and it could be brass only it isn't because it's inert to concentrated nitric acid. I've tried that already. There's only a shell of gold because it can be bent with moderate pressure. Besides, if it were solid gold, the egg would weigh over ten pounds."

Bronstein said, "It's some sort of hoax. It *must* be."

"A hoax that uses real gold? Remember, when I first saw this thing, it was covered completely with authentic unbroken eggshell. It's been easy to check a piece of the eggshell. Calcium carbonate. That's a hard thing to gimmick. And if we look inside the egg—I didn't want to do that on my own, chief—and find real egg, then we've got it, because that would be impossible to gimmick. Surely, this is worth an official project."

"How can I approach the Secretary with—" He stared at the egg.

But he did in the end. He made phone calls and sweated out most of a day. One or two of the department brass came to look at the egg.

Project Goose was started. That was July 20, 1955.

I was the responsible investigator to begin with and remained in titular charge throughout, though matters quickly got beyond me.

We began with the one egg. Its average radius was 35 millimeters (major axis, 72 millimeters; minor axis, 68 millimeters). The gold shell was 2.45 millimeters in thickness. Studying other eggs later on, we found this value to be rather high. The average thickness turned out to be 2.1 millimeters.

Inside *was* egg. It looked like egg and it smelled like egg.

Aliquots were analyzed and the organic constituents were reasonably normal. The white was 9.7 per cent albumin. The yolk had the normal complement of vitellin, cholesterol, phospholipid and carotenoid. We

lacked enough material to test for trace constituents but later on with more eggs at our disposal we did and nothing unusual showed up as far as the contents of vitamins, coenzymes, nucleotides, sulfhydryl groups, et cetera, et cetera were concerned.

One important gross abnormality that showed was the egg's behavior on heating. A small portion of the yolk, heated, "hard-boiled" almost at once. We fed a portion of the hard-boiled egg to a mouse. It survived.

I nibbled at another bit of it. Too small a quantity to taste, really, but it made me sick. Purely psychosomatic, I'm sure.

Boris W. Finley, of the Department of Biochemistry of Temple University—a department consultant—supervised these tests.

He said, referring to the hard-boiling, "The ease with which the egg-proteins are heat-denatured indicates a partial denaturation to begin with and, considering the nature of the shell, the obvious guilt would lie at the door of heavy-metal contamination."

So a portion of the yolk was analyzed for inorganic constituents, and it was found to be high in chloraurate ion, which is a singly-charged ion containing an atom of gold and four of chlorine, the symbol for which is $AuCl_4^-$. (The "Au" symbol for gold comes from the fact that the Latin word for gold is "aurum".) When I say the chloraurate ion content was high, I mean it was 3.2 parts per thousand, or 0.32 per cent. That's high enough to form insoluble complexes of "gold-protein" which would coagulate easily.

Finley said, "It's obvious this egg cannot hatch. Nor can any other such egg. It is heavy-metal poisoned. Gold may be more glamorous than lead but it is just as poisonous to proteins."

I agreed gloomily, "At least it's safe from decay, too."

"Quite right. No self-respecting bug would live in this chloraurifer-ous soup."

The final spectrographic analysis of the gold of the shell came in. Virtually pure. The only detectable impurity was iron which amounted to 0.23 per cent of the whole. The iron content of the egg yolk had been twice normal, also. At the moment, however, the matter of the iron was neglected.

One week after Project Goose was begun, an expedition was sent into Texas. Five biochemists went—the accent was still on biochemistry, you see—along with three truckloads of equipment, and a squadron of army personnel. I went along, too, of course.

As soon as we arrived, we cut MacGregor's farm off from the world.

That was a lucky thing, you know—the security measures we took right from the start. The reasoning was wrong, at first, but the results were good.

The Department wanted Project Goose kept quiet at the start simply

because there was always the thought that this might still be an elaborate hoax and we couldn't risk the bad publicity, if it were. And if it weren't a hoax, we couldn't risk the newspaper hounding that would definitely result over any goose-and-golden-egg story.

It was only well after the start of Project Goose, well after our arrival at MacGregor's farm, that the real implications of the matter became clear.

Naturally, MacGregor didn't like the men and equipment settling down all about him. He didn't like being told The Goose was government property. He didn't like having his eggs impounded.

He didn't like it but he agreed to it—if you can call it agreeing when negotiations are being carried on while a machine gun is being assembled in a man's barnyard and ten men, with bayonets fixed, are marching past while the arguing is going on.

He was compensated, of course. What's money to the government?

The Goose didn't like a few things, either—like having blood samples taken. We didn't dare anaesthetize it for fear of doing anything to alter its metabolism, and it took two men to hold it each time. Ever try to hold an angry goose?

The Goose was put under a twenty-four hour guard with the

threat of summary court-martial to any man who let anything happen to it. If any of those soldiers read this article, they may get a sudden glimmering of what was going on. If so, they will probably have the sense to keep shut about it. At least, if they know what's good for them, they will.

The blood of The Goose was put through every test conceivable.

It carried 2 parts per hundred thousand (0.002 per cent) of chloraurate ion. Blood taken from the hepatic vein was richer than the rest, almost 4 parts per hundred thousand.

Finley grunted. "The liver," he said.

We took X rays. On the X ray negative, the liver was a cloudy mass of light gray, lighter than the viscera in its neighborhood, because it stopped more of the X rays, because it contained more gold. The blood vessels showed up lighter than the liver proper and the ovaries were pure white. No X rays got through the ovaries at all.

It made sense and in an early report, Finley stated it as bluntly as possible. Paraphrasing the report, it went, in part:

"The chloraurate ion is secreted by the liver into the blood stream. The ovaries act as a trap for the ion, which is there reduced to metallic gold and deposited as a shell about the developing egg. Relatively high concentrations of unreduced chloraurate ion penetrate the contents of the developing egg.

"There is little doubt that The Goose finds this process useful as a means of getting rid of the gold atoms which, if allowed to accumulate, would undoubtedly poison it. Excretion by eggshell may be novel in the animal kingdom, even unique, but there is no denying that it is keeping The Goose alive.

"Unfortunately, however, the ovary is being locally poisoned to such an extent that few eggs are laid, probably not more than will suffice to get rid of the accumulating gold, and those few eggs are definitely unhatchable."

That was all he said in writing, but to the rest of us, he said, "That leaves one peculiarly embarrassing question."

I knew what it was. We all did.

Where was the gold coming from?

No answer to that for a while, except for some negative evidence. There was no perceptible gold in The Goose's feed, nor were there any gold-bearing pebbles about that it might have swallowed. There was no trace of gold anywhere in the soil of the area and a search of the house and grounds revealed nothing. There were no gold coins, gold jewelry, gold plate, gold watches or gold anything. No one on the farm even had as much as gold fillings in his teeth.

There was Mrs. MacGregor's wedding ring, of course, but she had only had one in her life and she was wearing that one.

So where was the gold coming from?

The beginnings of the answer came on August 16, 1955.

Albert Nevis, of Purdue, was forcing gastric tubes into The Goose —another procedure to which the bird objected strenuously—with the idea of testing the contents of its alimentary canal. It was one of our routine searches for exogenous gold.

Gold *was* found, but only in traces and there was every reason to suppose those traces had accompanied the digestive secretions and were, therefore, endogenous—from within, that is—in origin.

However, something else showed up, or the lack of it, anyway.

I was there when Nevis came into Finley's office in the temporary building we had put up overnight —almost—near the goosepen.

Nevis said, "The Goose is low in bile pigment. Duodenal contents show about none."

Finley frowned and said, "Liver function is probably knocked loop-the-loop because of its gold concentration. It probably isn't secreting bile at all."

"It *is* secreting bile," said Nevis. "Bile acids are present in normal quantity. Near normal, anyway. It's just the bile pigments that are missing. I did a fecal analysis and that was confirmed. No bile pigments."

Let me explain something at this point. Bile acids are steroids secreted by the liver into the bile and *via* that are poured into the upper end of the small intestine. These bile acids are detergentlike molecules which help to emulsify the fat in our diet—or The Goose's—and distribute them in the form of tiny bubbles through the watery intestinal contents. This distribution, or homogenization, if you'd rather, makes it easier for the fat to be digested.

Bile pigments, the substance that was missing in The Goose, are something entirely different. The liver makes them out of hemoglobin, the red oxygen-carrying protein of the blood. Wornout hemoglobin is broken up in the liver, the heme part being split away. The heme is made up of a squarish molecule—called a "porphyrin"—with an iron atom in the center. The liver takes the iron out and stores it for future use, then breaks the squarish molecule that is left. This broken porphyrin is bile pigment. It is colored brownish or greenish—depending on further chemical changes—and is secreted into the bile.

The bile pigments are of no use to the body. They are poured into the bile as waste products. They pass through the intestines and come out with the feces. In fact, the bile pigments are responsible for the color of the feces.

Finley's eyes began to glitter.

Nevis said, "It looks as though porphyrin catabolism isn't following the proper course in the liver. Doesn't it to you?"

It surely did. To me, too.

There was tremendous excitement after that. This was the first meta-

bolic abnormality, not directly involving gold, that had been found in The Goose!

We took a liver biopsy (which means we punched a cylindrical sliver out of The Goose reaching down into the liver.) It hurt The Goose but didn't harm it. We took more blood samples, too.

This time, we isolated hemoglobin from the blood and small quantities of the cytochromes from our liver samples. (The cytochromes are oxidizing enzymes that also contain heme.) We separated out the heme and in acid solution some of it precipitated in the form of a brilliant orange substance. By August 22, 1955, we had 5 micrograms of the compound.

The orange compound was similar to heme, but it was not heme. The iron in heme can be in the form of a doubly charged ferrous ion (Fe^{++}) or a triply charged ferric ion (Fe^{+++}), in which latter case, the compound is called hematin. (Ferrous and ferric, by the way, come from the Latin word for iron, which is "ferrum.")

The orange compound we had separated from heme had the porphyrin portion of the molecule all right, but the metal in the center was gold, to be specific, a triply charged auric ion (Au^{+++}). We called this compound "aureme," which is simply short for "auric heme."

Aureme was the first naturally-occurring gold-containing organic compound ever discovered. Ordinarily, it would rate headline news in the world of biochemistry. But now it was nothing; nothing at all in comparison to the further horizons its mere existence opened up.

The liver, it seemed, was not breaking up the heme to bile pigment. Instead it was converting it to aureme; it was replacing iron with gold. The aureme, in equilibrium with chloraurate ion, entered the blood stream and was carried to the ovaries where the gold was separated out and the porphyrin portion of the molecule disposed of by some as yet unidentified mechanism.

Further analyses showed that 29 per cent of the gold in the blood of The Goose was carried in the plasma in the form of chloraurate ion. The remaining 71 per cent was carried in the red blood corpuscles in the form of "auremoglobin." An attempt was made to feed The Goose traces of radioactive gold so that we could pick up radioactivity in plasma and corpuscles and see how readily the auremoglobin molecules were handled in the ovaries. It seemed to us the auremoglobin should be much more slowly disposed of than the dissolved chloraurate ion in the plasma.

The experiment failed, however, since we detected no radioactivity. We put it down to inexperience since none of us were isotopes men which was too bad since the failure was highly significant, really, and by not realizing it, we lost several weeks.

The auremoglobin was, of course, useless as far as carrying oxygen was concerned, but it only made up about

0.1 per cent of the total hemoglobin of the red blood cells so there was no interference with the respiration of The Goose.

This still left us with the question of where the gold came from and it was Nevis who first made the crucial suggestion.

"Maybe," he said, at a meeting of the group held on the evening of August 25, 1955, "The Goose doesn't replace the iron with gold. Maybe it *changes* the iron to gold."

Before I met Nevis personally that summer, I had known him through his publications—his field is bile chemistry and liver function—and had always considered him a cautious, clear-thinking person. Almost overcautious. One wouldn't consider him capable for a minute of making any such completely ridiculous statement.

It just shows the desperation and demoralization involved in Project Goose.

The desperation was the fact that there was nowhere, literally nowhere, that the gold could come from. The Goose was excreting gold at the rate of 38.9 grams of gold a day and had been doing it over a period of months. That gold had to come from somewhere and, failing that—absolutely failing that—it had to be made from something.

The demoralization that led us to consider the second alternative was due to the mere fact that we were face to face with The Goose That Laid The Golden Eggs; the undeniable GOOSE. With that, everything became possible. All of us were living in a fairy-tale world and all of us reacted to it by losing all sense of reality.

Finley considered the possibility seriously. "Hemoglobin," he said, "enters the liver and a bit of auremoglobin comes out. The gold shell of the eggs has iron as its only impurity. The egg yolk is high in only two things; in gold, of course, and also, somewhat, in iron. It all makes a horrible kind of distorted sense. We're going to need help, men."

We did and it meant a third stage of the investigation. The first stage had consisted of myself alone. The second was the biochemical task-force. The third, the greatest, the most important of all, involved the invasion of the nuclear physicists.

On September 5, 1955, John L. Billings of the University of California arrived. He had some equipment with him and more arrived in the following weeks. More temporary structures were going up. I could see that within a year we would have a whole research institution built about The Goose.

Billings joined our conference the evening of the 5th.

Finley brought him up to date and said, "There are a great many serious problems involved in this iron-to-gold idea. For one thing, the total quantity of iron in The Goose can only be of the order of half a gram, yet nearly 40 grams of gold a day are being manufactured."

Billings had a clear, high-pitched

voice. He said, "There's a worse problem than that. Iron is about at the bottom of the packing fraction curve. Gold is much higher up. To convert a gram of iron to a gram of gold takes just about as much energy as is produced by the fissioning of one gram of U-235."

Finley shrugged. "I'll leave the problem to you."

Billings said, "Let me think about it."

He did more than think. One of the things done was to isolate fresh samples of heme from The Goose, ash it and send the iron oxide to Brookhaven for isotopic analysis. There was no particular reason to do that particular thing. It was just one of a number of individual investigations, but it was the one that brought results.

When the figures came back, Billings choked on them. He said, "There's no Fe^{56}."

"What about the other isotopes?" asked Finley at once.

"All present," said Billings, "in the appropriate relative ratios, but no detectable Fe^{56}."

I'll have to explain again: Iron, as it occurs naturally, is made up of four different isotopes. These isotopes are varieties of atoms that differ from one another in atomic weight. Iron atoms with an atomic weight of 56, or Fe^{56}, makes up 91.6 per cent of all the atoms in iron. The other atoms have atomic weights of 54, 57 and 58.

The iron from the heme of The Goose was made up only of Fe^{54}, Fe^{57} and Fe^{58}. The implication was obvious. Fe^{56} was disappearing while the other isotopes weren't and this meant a nuclear reaction was taking place. A nuclear reaction could take one isotope and leave others be. An ordinary chemical reaction, any chemical reaction at all, would have to dispose of all isotopes equally.

"But it's energically impossible," said Finley.

He was only saying that in mild sarcasm with Billings' initial remark in mind. As biochemists, we knew well enough that many reactions

went on in the body which required an input of energy and that this was taken care of by coupling the energy-demanding reaction with an energy-producing reaction.

However chemical reactions gave off or took up a few kilocalories per mole. Nuclear reactions gave off or took up millions. To supply energy for an energy-demanding nuclear reaction required, therefore, a second, and energy-producing, nuclear reaction.

We didn't see Billings for two days.

When he did come back, it was to say, "See here. The energy-producing reaction must produce just as much energy per nucleon involved as the energy-demanding reaction uses up. If it produces even slightly less, then the overall reaction won't go. If it produces even slightly more, then considering the astronomical number of nucleons involved, the excess energy produced would vaporize The Goose in a fraction of a second."

"So?" said Finley.

"So the number of reactions possible is very limited. I have been able to find only one plausible system. Oxygen-18, if converted to iron-56 will produce enough energy to drive the iron-56 on to gold-197. It's like going down one side of a roller-coaster and then up the other. We'll have to test this."

"How?"

"First, suppose we check the isotopic composition of the oxygen in The Goose."

Oxygen is made up of three stable isotopes, almost all of it O^{16}. O^{18} makes up only one oxygen atom out of 250.

Another blood sample. The water content was distilled off in vacuum and some of it put through a mass spectrograph. There was O^{18} there but only one oxygen atom out of 1300. Fully 80 per cent of the O^{18} we expected wasn't there.

Billings said, "That's corroborative evidence. Oxygen-18 is being used up. It is being supplied constantly in the food and water fed to The Goose, but it is still being used up. Gold-197 is being produced. Iron-56 is one intermediate and since the reaction that uses up iron-56 is faster than the one that produces it, it has no chance to reach significant concentration and isotopic analysis shows its absence."

We weren't satisfied, so we tried again. We kept The Goose on water that had been enriched with O^{18} for a week. Gold production went up almost at once. At the end of a week, it was producing 45.8 grams a while the O^{18} content of its body water was no higher than before.

"There's no doubt about it," said Billings.

He snapped his pencil and stood up. "That Goose is a living nuclear reactor."

The Goose was obviously a mutation.

A mutation suggested radiation among other things and radiation brought up the thought of nuclear

tests conducted in 1952 and 1953 several hundred miles away from the site of MacGregor's farm. (If it occurs to you that no nuclear tests have been conducted in Texas, it just shows two things; I'm not telling you everything and you don't know everything.)

I doubt that at any time in the history of the atomic era was background radiation so thoroughly analyzed and the radioactive content of the soil so rigidly sifted.

Back records were studied. It didn't matter how top-secret they were. By this time, Project Goose had the highest priority that had ever existed.

Even weather records were checked in order to follow the behavior of the winds at the time of the nuclear tests.

Two things turned up.

One: The background radiation at the farm was a bit higher than normal. Nothing that could possibly do harm, I hasten to add. There were indications, however, that at the time of the birth of The Goose, the farm had been subjected to the drifting edge of at least two fallouts. Nothing really harmful, I again hasten to add.

Second: The Goose, alone of all geese on the farm, in fact, alone of all living creatures on the farm that could be tested, including the humans, showed no radioactivity at all. Look at it this way: *everything* shows traces of radioactivity; that's what is meant by background radiation. But The Goose showed none.

Finley sent one report on December 6, 1955, which I can paraphrase as follows:

"The Goose is a most extraordinary mutation, born of a high-level radioactivity environment which at once encouraged mutations in general and which made this particular mutation a beneficial one.

"The Goose has enzyme systems capable of catalyzing various nuclear reactions. Whether the enzyme system consists of one enzyme or more than one is not known. Nor is anything known of the nature of the enzymes in question. Nor can any theory be yet advanced as to how an enzyme can catalyze a nuclear reaction, since these involve particular interactions with forces five orders of magnitude higher than those involved in the ordinary chemical reactions commonly catalyzed by enzymes.

"The overall nuclear change is from oxygen-18 to gold-197. The oxygen-18 is plentiful in its environment, being present in significant amount in water and all organic foodstuffs. The gold-197 is excreted via the ovaries. One known intermediate is iron-56 and the fact that auremoglobin is formed in the process leads us to suspect that the enzyme or enzymes involved may have heme as a prosthetic group.

"There has been considerable thought devoted to the value this overall nuclear change might have to the goose. The oxygen-18 does it no harm and the gold-197 is troublesome to be rid of, potentially poisonous, and a cause of its sterility.

Its formation might possibly be a means of avoiding greater danger. This danger—"

But just reading it in the report, friend, makes it all seem so quiet, almost pensive. Actually, I never saw a man come closer to apoplexy and survive than Billings did when he found out about our own radioactive gold experiments which I told you about earlier—the ones in which we detected no radioactivity in the goose, so that we discarded the results as meaningless.

Many times over he asked how we could possibly consider it unimportant that we had lost radioactivity.

"You're like the cub reporter," he said, "who was sent to cover a society wedding and on returning said there was no story because the groom hadn't shown up.

"You fed The Goose radioactive gold and lost it. Not only that you failed to detect any natural radioactivity about The Goose. Any carbon-14. Any potassium-40. And you called it failure."

We started feeding The Goose radioactive isotopes. Cautiously, at first, but before the end of January of 1956 we were shoveling it in.

The Goose remained nonradioactive.

"What it amounts to," said Billings, "is that this enzyme-catalyzed nuclear process of The Goose manages to convert any unstable isotope into a stable isotope."

"Useful," I said.

"Useful? It's a thing of beauty. It's the perfect defense against the atomic age. Listen, the conversion of oxygen-18 to gold-197 should liberate eight and a fraction positrons per oxygen atom. That means eight and a fraction gamma rays as soon as each positron combines with an electron. No gamma rays either. The Goose must be able to absorb gamma rays harmlessly."

We irradiated The Goose with gamma rays. As the level rose, The Goose developed a slight fever and we quit in panic. It was just fever, though, not radiation sickness. A day passed, the fever subsided, and The Goose was as good as new.

"Do you see what we've got?" demanded Billings.

"A scientific marvel," said Finley.

"Man, don't you see the practical applications? If we could find out the mechanism and duplicate it in the test tube, we've got a perfect method of radioactive ash disposal. The most important drawback preventing us from going ahead with a full-scale atomic economy is the headache of what to do with the radioactive isotopes manufactured in the process. Sift them through an enzyme preparation in large vats and that would be it.

"Find out the mechanism, gentlemen, and you can stop worrying about fallouts. We would find a protection against radiation sickness.

"Alter the mechanism somehow and we can have Geese excreting any element needed. How about uranium-235 eggshells?

"The mechanism! The mechanism!"

We sat there, all of us, staring at The Goose.

If only the eggs would hatch. If only we could get a tribe of nuclear-reactor Geese.

"It must have happened before," said Finley. "The legends of such Geese must have started somehow."

"Do you want to wait?" asked Billings.

If we had a gaggle of such Geese, we could begin taking a few apart. We could study its ovaries. We could prepare tissue slices and tissue homogenates.

That might not do any good. The tissue of a liver biopsy did not react with oxygen-18 under any conditions we tried.

But then we might perfuse an intact liver. We might study intact embryos, watch for one to develop the mechanism.

But with only one Goose, we could do none of that.

We don't dare kill The Goose That Lays The Golden Eggs.

The secret was in the liver of that fat Goose.

Liver of fat goose! *Pate de foie gras!* No delicacy to us!

Nevis said, thoughtfully, "We need an idea. Some radical departure. Some crucial thought."

"Saying it won't bring it," said Billings despondently.

And in a miserable attempt at a joke, I said, "We could advertise in the newspapers," and that gave *me* an idea.

"Science fiction!" I said.

"What?" said Finley.

"Look, science-fiction magazines print gag articles. The readers consider it fun. They're interested." I told them about the thiotimoline articles Asimov wrote and which I had once read.

The atmosphere was cold with disapproval.

"We won't even be breaking security regulations," I said, "because no one will believe it." I told them about the time in 1944 when Cleve Cartmill wrote a story describing the atom bomb one year early and the F.B.I. kept its temper.

"And science-fiction readers have ideas. Don't underrate them. Even if they think it's a gag article, they'll send their notions in to the editor. And since we have no ideas of our own; since we're up a dead-end street, what can we lose?"

They still didn't buy it.

So I said, "And you know— The Goose won't live forever."

That did it, somehow.

We had to convince Washington; then I got in touch with John Campbell and he got in touch with Asimov.

Now the article is done. I've read it, I approve, and I urge you all not to believe it. Please don't.

Only—

Any ideas?

THE END

DUST RAG

It has been said before that the little things in life are what count. The big things about living on another world are easy to predict; it's the petty nuisances . . . that are deadly!

BY HAL CLEMENT

Illustrated by van Dongen

"Checking out."

"Checked, Ridge. See you soon."

Ridging glanced over his shoulder at Beacon Peak, as the point where the relay station had been mounted was known. The gleaming dome of its leaden meteor shield was visible as a spark; most of the lower peaks of Harpalus were already below the horizon, and with them the last territory with which Ridging or Shandara could claim familiarity. The humming turbine tractor that carried them was the only sign of humanity except each others' faces—the thin crescent of their home world was too close to the sun to be seen easily, and Earth doesn't look very "human" from outside in any case.

The prospect ahead was not ex-

actly strange, of course. Shandara had remarked several times in the last four weeks that a man who had seen any of the moon had seen all of it. A good many others had agreed with him. Even Ridging, whose temperament kept him normally expecting something new to happen, was beginning to get a trifle bored with the place. It wasn't even dangerous; he knew perfectly well what exposure to vacuum would mean, but checking spacesuit and air-lock valves had become a matter of habit long before.

Cosmic rays went through plastic suits and living bodies like glass, for the most part ineffective because unabsorbed; meteors blew microscopic holes through thin metal, but scarcely marked spacesuits or hulls, as far as current experiences went; the "dust-hidden crevasses" which they had expected to catch unwary men or vehicles simply didn't exist—the dust was too dry to cover any sort of hole, except by filling it completely. The closest approach to a casualty suffered so far had occurred when a man had missed his footing on the ladder outside the *Albireo's* air lock and narrowly avoided a hundred and fifty foot fall.

Still, Shandara was being cautious. His eyes swept the ground ahead of their tracks, and his gauntleted hands rested lightly on brake and steering controls as the tractor glided ahead.

Harpalus and the relay station were out of sight now. Another glance behind assured Ridging of that. For the first time in weeks he was out of touch with the rest of the group, and for the first time he wondered whether it was such a good idea. Orders had been strict; the radius of exploration settled on long before was not to be exceeded. Ridging had been completely in favor of this; but it was his own instruments which had triggered the change of schedule.

One question about the moon to which no one could more than guess an answer in advance was that of its magnetic field. Once the group was on the surface it had immediately become evident that there was one, and comparative readings had indicated that the south magnetic pole—or *a* south magnetic pole—lay a few hundred miles away. It had been decided

to modify the program to check the region, since the last forlorn chance of finding any trace of a gaseous envelope around the moon seemed to lie in auroral investigation. Ridging found himself, to his intense astonishment, wondering why he had volunteered for the trip and then wondering how such thoughts could cross his mind. He had never considered himself a coward, and certainly had no one but himself to blame for being in the tractor. No one had made him volunteer, and any technician could have set up and operated the equipment.

"Come out of it, Ridge. Anyone would think you were worried." Shandara's careless tones cut into his thoughts. "How about running this buggy for a while? I've had her for a hundred kilos."

"Right." Ridging slipped into the driver's seat as his companion left it without slowing the tractor. He did not need to find their location on the photographic map clipped beside the panel; he had been keeping a running check almost unconsciously between the features it showed and the landmarks appearing over the horizon. A course had been marked on it, and navigation was not expected to be a problem even without a magnetic compass.

The course was far from straight, though it led over what passed for fairly smooth territory on the moon. Even back on Sinus Roris the tractor had had to weave its way around numerous obstacles; now well onto the Mare Frigoris the situation was no better, and according to the map it was nearly time to turn south through the mountains, which would be infinitely worse. According to the photos taken during the original landing approach the journey would be possible, however, and would lead through the range at its narrowest part out onto Mare Imbrium. From that point to the vicinity of Plato, where the region to be investigated lay, there should be no trouble at all.

Oddly enough, there wasn't. Ridging was moderately surprised; Shandara seemed to take it as a matter of course. The cartographer had eaten, slept, and taken his turn at driving with only an occasional remark. Ridging was beginning to believe by the time they reached their goal that his companion was actually as bored with the moon as he claimed to be. The thought, however, was fleeting; there was work to be done.

About six hundred pounds of assorted instruments were attached to the trailer which had been improvised from discarded fuel tanks. The tractor itself could not carry them; its entire cargo space was occupied by another improvisation—an auxiliary fuel tank which had been needed to make the present journey possible. The instruments had to be removed, set up in various spots, and permitted to make their records for the next thirty hours. This would have been a minor task, and possibly even justified a little boredom, had it not been for the fact that some of the "spots"

were supposed to be as high as possible. Both men had climbed Lunar mountains in the last four weeks, and neither was worried about the task; but there was some question as to which mountain would best suit their needs.

They had stopped on fairly level ground south and somewhat west of Plato—"sunset" west, that is, not astronomical. There were a number of fairly prominent elevations in sight. None seemed more than a thousand meters or so in height, however, and the men knew that Plato in one direction and the Teneriffe Mountains in the other had peaks fully twice as high. The problem was which to choose.

"We can't take the tractor either way," pointed out Shandara. "We're cutting things pretty fine on the fuel question as it is. We are going to have to pack the instruments ourselves, and it's fifty or sixty kilometers to Teneriffe before we even start climbing. Plato's a lot closer."

"The *near side* of Plato's a lot closer," admitted Ridging, "but the measured peaks in its rim must be on the east and west sides, where they can cast shadows across the crater floor. We might have to go as far for a really good peak as we would if we headed south."

"That's not quite right. Look at the map. The near rim of the crater is fairly straight, and doesn't run straight east and west; it must cast shadows that they could measure from Earth. Why can't it contain some of those two thousand meter humps mentioned in the atlas?"

"No reason why it *can't;* but we don't know that it *does.* This map doesn't show."

"It doesn't show for Teneriffe, either."

"That's true, but there isn't much choice there, and we know that there's at least one high peak in a fairly small area. Plato is well over three hundred kilometers around."

"It's still a closer walk, and I don't see why, if there are high peaks at any part of the rim, they shouldn't be fairly common all around the circumference."

"I don't see *why* either," retorted Ridging, "but I've seen several craters for which that wasn't true. So have you." Shandara had no immediate answer to this, but he had no intention of exposing himself to an unnecessarily long walk if he could help it. The instruments to be carried were admittedly light, at least on the moon; but there would be no chance of opening spacesuits until the men got back to the tractor, and spacesuits got quite uncomfortable after a while.

It was the magnetometer that won Shandara's point for him. This pleased him greatly at the time, though he was heard to express a different opinion later. The meter itself did not attract attention until the men were about ready to start, and he had resigned himself to the long walk after a good deal more argument; but a final check of the recorders al-

ready operating made Ridging stop and think.

"Say, Shan, have you noticed any sunspots lately?"

"Haven't looked at the sun, and don't plan to."

"I know. I mean, have any of the astronomers mentioned anything of the sort?"

"I didn't hear them, and we'll never be able to ask until we get back. Why?"

"I'd say there was a magnetic storm of some sort going on. The intensity, dip, and azimuth readings have all changed quite a bit in the last hour."

"I thought dip was near vertical anyway."

"It is, but that doesn't keep it from changing. You know, Shan, maybe it would be better if we went to Plato, instead."

"That's what I've been saying all along. What's changed your mind?"

"This magnetic business. On Earth, such storms are caused by charged particles from the sun, deflected by the planet's magnetic field and forming what amounts to tremendous electric currents which naturally produce fields of their own. If that's what is happening here, it would be nice to get even closer to the local magnetic vertical, if we can; and that seems to be in, or at least near, Plato."

"That suits me. I've been arguing that way all along. I'm with you."

"There's one other thing—"

"What?"

"This magnetometer ought to go along with us, as well as the stuff we were taking anyway. Do you mind helping with the extra weight?" Shandara had not considered this aspect of the matter, but since his arguments had been founded on the question of time rather than effort he agreed readily to the additional labor.

"All right. Just a few minutes while I dismount and repack this gadget, and we'll be on our way." Ridging set to work, and was ready in the specified time, since the apparatus had been designed to be handled by spacesuited men. The carrying racks that took the place of regular packs made the travelers look top-heavy, but they had long since learned to keep their balance under such loads. They turned until the nearly motionless sun was behind them and to their right, and set out for the hills ahead.

These elevations were not the peaks they expected to use; the moon's near horizon made those still invisible. They did, however, represent the outer reaches of the area which had been disturbed by whatever monstrous explosion had blown the ring of Plato in the moon's crust. As far as the men were concerned, these hills simply meant that very little of their journey would be across level ground, which pleased them just as well. Level ground was sometimes an inch or two deep in dust; and while dust could not hide deep cracks it could and sometimes did fill broader hollows and cover irregularities where one could trip.

For a top-heavy man, this could be a serious nuisance. Relatively little dust had been encountered by any of the expedition up to this point, since most of their work had involved slopes or peaks; but a few annoying lessons had been learned.

Shandara and Ridging stuck to the relatively dust-free slopes, therefore. The going was easy enough for experienced men, and they traveled at pretty fair speed—some ten or twelve miles an hour, they judged. The tractor soon disappeared, and compasses were useless, but both men had a good eye for country, and were used enough to the Lunar landscape to have no particular difficulty in finding distinctive features. They said little, except to call each other's attention to particularly good landmarks.

The general ground level was going up after the first hour and a half, though there was still plenty of downhill travel. A relatively near line of peaks ahead was presumably the crater rim; there was little difficulty in deciding on the most suitable one and heading for it. Naturally the footing became worse and the slopes steeper as they approached, but nothing was dangerous even yet. Such crevasses as existed were easy both to see and to jump, and there are few loose rocks on the moon.

It was only about three and a half hours after leaving the tractor, therefore, that the two men reached the peak they had selected, and looked out over the great malled plain of Plato. They couldn't see all of it, of course; Plato is a hundred kilometers across, and even from a height of two thousand meters the farther side of the floor lies below the horizon. The opposite rim could be seen, of course, but there was no easy way to tell whether any of the peaks visible there were as high as the one from which the men saw them. It didn't really matter; this one was high enough for their purposes.

The instruments were unloaded and set up in half an hour. Ridging did most of the work, with a professional single-mindedness which Shandara made no attempt to emulate. The geophysicist scarcely glanced at the crater floor after his first look around upon their arrival, while Shandara did little else. Ridging was not surprised; he had been reasonably sure that his friend had had ulterior reasons for wanting to come this way.

"All right," he said, as he straightened up after closing the last switch, "when do we go down, and how long do we take?"

"Go down where?" asked Shandara innocently.

"Down to the crater floor, I suppose. I'm sure you don't see enough to satisfy you from here. It's just an ordinary crater, of course, but it's three times the diameter of Harpalus even if the walls are less than half as high, and you'll surely want to see every square meter of the floor."

"I'll want to see *some* of the floor, anyway." Shandara's tone carried feeling even through the suit radios.

It's nice of you to realize that we have to go down. I wish you realized why."

"You mean . . . you mean you really expect to climb down there?" Ridging, in spite of his knowledge of the other's interests, was startled. "I didn't really mean—"

"I didn't think you did. You haven't looked over the edge once."

Ridging repaired the omission, letting his gaze sweep carefully over the grayish plain at the foot of the slope. He knew that the floor of Plato was one of the darker areas on the moon, but had never supposed that this fact constituted a major problem.

"I don't get it," he said at last. "I don't see anything. The floor is smoother than that of Harpalus, I'd say, but I'm not really sure even of that, from this distance. It's a couple of kilos down and I don't know how far over."

"You brought the map." It was not a question.

"Of course."

"Look at it. It's a good one." Ridging obeyed, bewildered. The map was good, as Shandara had said; its scale was sufficient to show Plato some fifteen centimeters across, with plenty of detail. It was basically an enlargement of a map published on Earth, from telescopic observations; but a good deal of detail had been added from photographs taken during the approach and landing of the expedition. Shandara knew that; it was largely his own work.

As a result, Ridging was not long in seeing what his companion meant. The map showed five fairly large craterlets *within* Plato, and nearly a hundred smaller features.

Ridging could see none of them from where he stood.

He looked thoughtfully down the slope, then at the other man.

"I begin to see what you mean. Did you expect something like this? Is that why you wanted to come here? Why didn't you tell me?"

"I didn't expect it, though I had a vague hope. A good many times in the past, observers have reported that the features on the floor of this crater were obscured. P[illegible]. Pickering, at the beginning of the century, thought of it as an active volcanic area; others have blamed the business on clouds —and others, of course, have assumed the observers themselves were at fault, though that is pretty hard to justify. I didn't really expect to get a chance to check up on the phenomenon, but I'm sure you don't expect me to stay up here now."

"I suppose not." Ridging spoke in a tone of mock resignation. The problem did not seem to concern his field directly, but he judged rightly that the present situation affected Shandara the way an offer of a genuine fragment of Terrestrial core material would influence Ridging himself. "What do you plan to take down? I suppose you want to get measures of some sort."

"Well, there isn't too much here that will apply, I'm afraid. I have my own camera and some filters, which may do some good. I can't see that

the magnetic stuff will be any use down there. We don't have any pressure measuring or gas collecting gadgetry; I suppose if we'd brought a spare water container from the tractor we could dump it, but we didn't and I'd bet that nothing would be found in it but water vapor if we did. We'll just have to go down and see what our eyes will tell us, and record anything that seems recordable on film. Are you ready?"

"Ready as I ever will be." Ridging knew the remark was neither original nor brilliant, but nothing else seemed to fit.

The inner wall of the crater was a good deal steeper than the one they had climbed, but still did not present a serious obstacle. The principal trouble was that much of the way led through clefts where the sun did not shine, and the only light was reflected from distant slopes. There wasn't much of it, and the men had to be careful of their footings—there was an occasional loose fragment here, and a thousand-meter fall is no joke even on the moon. The way did not lead directly toward the crater floor; the serrated rim offered better ways between its peaks, hairpinning back and forth so that sometimes the central plain was not visible at all. No floor details appeared as they descended, but whatever covered them was still below; the stars, whenever the mountains cut off enough sidelight, were clear as ever. Time and again Shandara stopped to look over the great plain, which seemed limitless now that the peaks on the farther side had dropped below the horizon, but nothing in the way of information rewarded the effort.

It was the last few hundred meters of descent that began to furnish something of interest. Shandara was picking his way down an unusually uninviting bit of slope when Ridging, who had already negotiated it, spoke up sharply.

"Shan! Look at the stars over the northern horizon! Isn't there some sort of haze? The sky around them looks a bit lighter." The other paused and looked.

"You're right. But how could that be? There couldn't suddenly be enough air at this level—gases don't behave that way. Van Maanen's star might have an atmosphere twenty meters deep, but the moon doesn't and never could have."

"There's *something* between us and the sky."

"That I admit; but I still say it isn't gas. Maybe dust—"

"What would hold it up? Dust is just as impossible as air."

"I don't know. The floor's only a few yards down—let's not stand here guessing." They resumed their descent.

The crater floor was fairly level, and sharply distinguished from the inner slope of the crater wall. Something had certainly filled, partly at least, the vast pit after the original explosion; but neither man was disposed to renew the argument about the origin of Lunar craters just then. They scrambled down the remaining

few yards of the journey and stopped where they were, silently.

There *was* something blocking vision; the horizon was no longer visible, nor could the stars be seen for a few degrees above where it should have been. Neither man would have had the slightest doubt about the nature of the obscuring matter had he been on Earth; it bore every resemblance to dust. It *had* to be dust.

But it couldn't be. Granted that dust can be fine enough to remain suspended for weeks or months in Earth's atmosphere when a volcano like Krakatoa hurls a few cubic miles of it aloft, the moon had not enough gas molecules around it to interefere with the trajectory of a healthy virus particle—and no seismometer in the last four weeks had registered crustal activity even approaching the scale of vulcanism. There was nothing on the moon to throw the dust up, and even less to keep it there.

"Meteor splash?" Shandara made the suggestion hesitantly, fully aware that while a meteor might raise dust it could never keep it aloft. Ridging did not bother to answer, and his friend did not repeat the suggestion.

The sky straight overhead seemed clear as ever; whatever the absorbing material was it apparently took more than the few feet above them to show much effect. That could not be right, though, Ridging reflected, if this stuff was responsible for hiding the features which should have been visible from the crater rim. Maybe it was thicker farther in. If so, they'd better go on—there might be some chance of collecting samples after all.

He put this to Shandara, who agreed; and the two started out across the hundred kilometer plain.

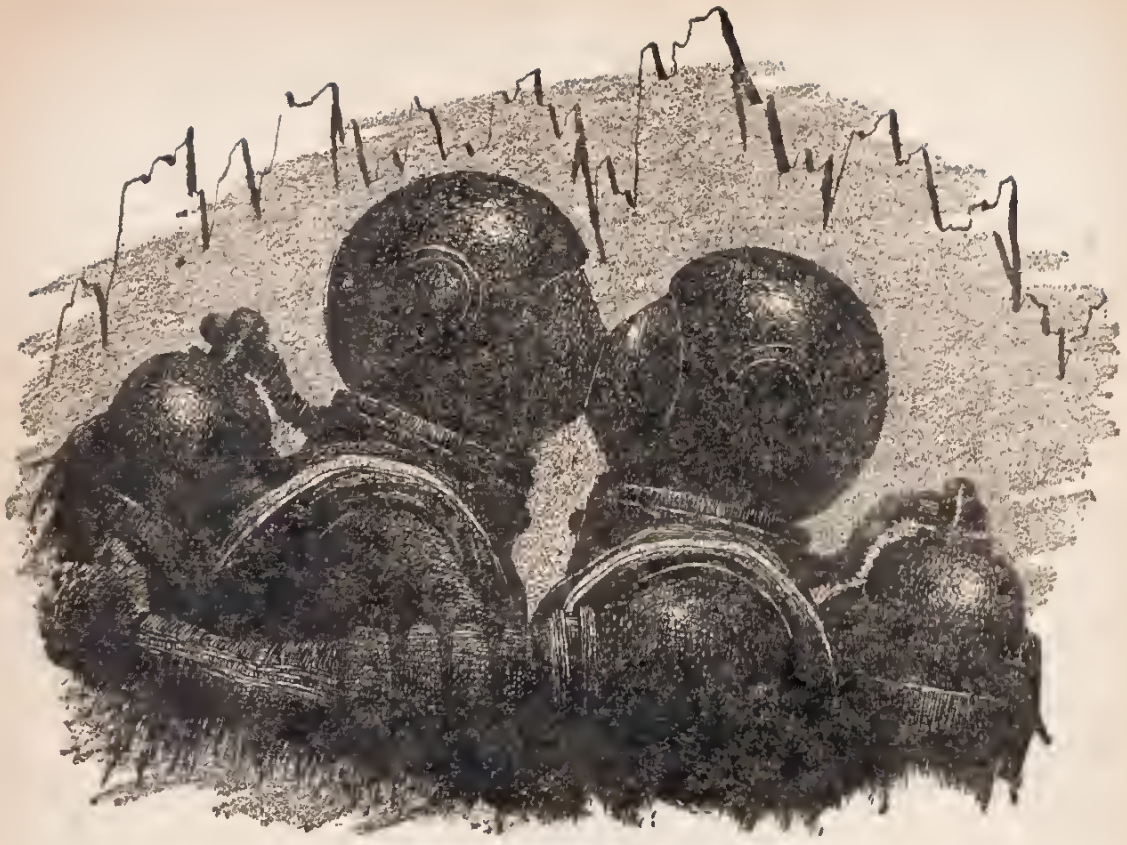
The surface *was* fairly smooth, though a pattern of minute cracks suggestive of the joints formed in cooling basalt covered it almost completely. These were not wide enough even to constitute a tripping danger, and the men ignored them for the time being, though Ridging made a mental note to get a sample of the rock if he could detach one.

The obscuration did thicken as they progressed, and by the time they had gone half a dozen kilometers it was difficult to see the crater wall behind them. Looking up, they saw that all but the brighter stars had faded from view even when the men shaded their eyes from the sunlit rock around them.

"Maybe gas is coming from these cracks, carrying dust up with it?" Shandara was no geologist, but had an imagination. He had also read most of the serious articles which had ever been published about the moon.

"We could check. If that were the case, it should be possible to see currents coming from them; the dust would be thicker just above a crack than a few centimeters away. If we had something light, like a piece of paper, it might be picked up."

"Worth trying. We have the map," Shandara pointed out. "That should do for paper; the plastic is



thin enough." Ridging agreed. With some difficulty—spacesuit gloves were not designed for that purpose—he tore a tiny corner off the sheet on which the map was printed, knelt down, and held the fragment over one of the numerous cracks. It showed no tendency to flutter in his grasp, and when he let go it dropped as rapidly as anything ever did on the moon, to lie quietly directly across the crack he had been testing. He tried to pick it up, but could not get a grip on it with his stiff gloves.

"That one didn't seem to pan out," he remarked, standing up once more.

"Maybe the paper was too heavy—this stuff must be awfully fine—or else it's coming from only a few of the cracks."

"Possibly; but I don't think it's practical to try them all. It would be smarter to figure some way to get a sample of this stuff, and let people with better lab facilities figure out what it is and what holds it off the surface."

"I've been trying to think of a way to do that. If we laid the map out on the ground, some of the material might settle on it."

"Worth trying. If it does, though, we'll have another question—why does it settle there and yet remain suspended long enough to do what is being done? We've been more than an hour coming down the slope,

and I'll bet your astronomical friends of the past have reported obscurations longer lasting even than that."

"They have. Well, even if it does raise more problems it's worth trying. Spread out the map, and we'll wait a few minutes." Ridging obeyed; then, to keep the score even, came up with an idea of his own.

"Why don't you lay your camera on the ground pointing up and make a couple of time exposures of the stars? You could repeat them after we get back in the clear, and maybe get some data on the obscuring power of this material."

"Good enough." Shandara removed the camera from its case, clipped a sun shade over its lense, and looked up to find a section of sky with a good selection of stars. As usual, he had to shield his eyes both from sunlight and from the glare of the nearby hills; but even then he did not seem satisfied.

"This stuff is getting thicker, I think," he said. "It's scattering enough light so that it's hard to see any stars at all—harder than it was a few minutes ago, I'd say," Ridging imitated his maneuver, and agreed.

"That's worth recording, too," he pointed out. "Better stay here a while and get several shots at different times." He looked down again. "It certainly *is* getting thicker. I'm having trouble seeing you, now."

Human instincts being what they are, the solution to the mystery followed automatically and immediately. A man who fails, for any reason, to see as clearly as he expects usually rubs his eyes—if he can get at them. A man wearing goggles or a space helmet may just possibly control this impulse, but he follows the practically identical one of wiping the panes through which he looks. Ridging did not have a handkerchief within reach, of course, and the gauntlet of a spacesuit is not one of the best windshield wipers imaginable; but without giving a single thought to the action, he wiped his face plate with his gauntlet.

Had there been no results he would not have been surprised; he had no reason to expect any. He would probably have dismissed the matter, perhaps with a faint hope that his companion might not have noticed the futile gesture. However, there were results. Very marked ones.

The points where the plastic of the gauntlet actually touched the face plate were few; but they left trails all the way across—opaque trails. Surprised and still not thinking, Ridging repeated the gesture in an automatic effort to wipe the smears of whatever it was from his helmet; he only made matters worse. He did not quite cover the supposedly transparent area with glove trails—but in the few seconds after he got control of his hand the streaks spread and merged until nothing whatever was visible. He was not quite in darkness; sunlight penetrated the obscuring layer, but he could not see any details.

"Shan!" The cry contained almost a note of panic. "I can't see at all.

Something's covering my helmet!" The cartographer straightened up from his camera and turned toward his friend.

"How come? You look all right from here. I can't see too clearly, though—"

Reflexes are wonderful. It took about five seconds to blind Shandara as thoroughly as Ridging. He couldn't even find his camera to close the shutter.

"You know," said Ridging thoughtfully after two or three minutes of heavy silence, "we should have been able to figure all this out without coming down here."

"Why?"

"Oh, it's plain as anything—"

"Nothing, and I mean *nothing,* is plain right now."

"I suppose a map maker would joke while he was surveying Gehenna. Look, Shan, we have reason to believe there's a magnetic storm going on, which strongly suggests charged particles from the sun. We are standing, for practical purposes, on the moon's south magnetic pole. Most level parts of the moon are covered with dust—but we walked over bare rock from the foot of the rim to here. Don't those items add up to something?"

"Not to me."

"Well, then, add the fact that electrical attraction and repulsion are inverse square forces like gravity, but involve a vastly bigger proportionality constant."

"If you're talking about scale I know all about it, but you still don't paint me a picture."

"All right. There are, at a guess, protons coming from the sun. They are reaching the moon's surface here —virtually all of them, since the moon has a magnetic field but no atmosphere. The surface material is one of the lousiest imaginable electrical conductors, so the dust normally on the surface picks up *and keeps* a charge. And what, dear student, happens to particles carrying like electrical charges?"

"They are repelled from each other."

"Head of the class. And if a hundred-kilometer circle with a rim a couple of kilos high is charged all over, what happens to the dust lying on it?"

Shandara did not answer; the question was too obviously rhetorical. He thought for a moment or two, instead, then asked, "How about our face plates?"

Ridging shrugged—a rather useless gesture, but the time for fighting bad habits had passed some minutes before.

"Bad luck. Whenever two materials rub against each other, electrons come loose. Remember your rubber-and-cat-fur demonstrations in grade school. Unless the materials are of identical electronic make-up, which for practical purposes means unless they are the same substance, one of them will hang onto the electrons a little—or a lot—better than the other, so one will have a negative net

charge and the other a positive one. It's our misfortune that the difference between the plastic in our face plates and that in the rest of the suits is the wrong way; when we rubbed the two, the face plates picked up a charge opposite to that of the surrounding dust—probably negative, since I suppose the dust is positive and a transparent material should have a good grip on its electrons."

"Then the rest of our suits, and the gloves we wiped with in particular, ought to be clean."

"Ought to be. I'd like nothing better than a chance to check the point."

"Well, the old cat's fur didn't stay charged very long, as I remember. How long will it take this to leak off, do you think?"

"Why should it leak off at all?"

"What? Why, I should think—Hm-m-m." Shandara was silent for a moment. "Water *is* pretty wonderful stuff, isn't it?"

"Yep. And air has its uses, too."

"Then we're . . . Ridge, we've got to *do* something. Our air will last indefinitely, but you still can't stay in a spacesuit too long."

"I agree that we should do something; I just haven't figured out what. Incidentally, just how sure are you that our air will last? The windows of the regenerators are made, as far as I know, of the same plastic our face plates are. What'll you bet you're not using emergency oxygen right now?"

"I don't know—I haven't checked the gauges."

"I'll say you haven't. You won't, either; they're outside your helmet."

"But if we're on emergency now, we could hardly get back to the tractor starting this minute. We've got to get going."

"Which way?"

"Toward the rim!"

"Be specific, son. Just which way is that? And please don't point; it's rude, and I can't see you anyway."

"All right, don't rub it in. But Ridge, what *can* we do?"

"While this stuff is on our helmets, and possibly our air windows, nothing. We couldn't climb even if we knew which way the hills were. The only thing which will do us the least good is to get this dust off us; and that will do the trick. As my mathematical friends would say, it is necessary and sufficient."

"All right, I'll go along with that. We know that the material the suits are made of is worse than useless for wiping, but wiping and electrical discharge seem to be the only methods possible. What do we have which by any stretch of the imagination might do either job?"

"What is your camera case made of?" asked Ridging.

"As far as I know, same as the suits. It's a regular clip-on carrier, the sort that came with the suits—remember Tazewell's remarks about the dividends AirTight must have paid when they sold the suits to the Project? It reminded me of the old days when you had to buy a lot of accessories with your automobile whether you wanted them or not—"

"All right, you've made your

point. The case is the same plastic. It would be a pretty poor wiper anyway; it's a box rather than a bag, as I remember. What else is there?"

The silence following this question was rather lengthy. The sad fact is that spacesuits don't have outside pockets for handkerchiefs. It did occur to Ridging after a time that he was carrying a set of geological specimen bags; but when he finally did think of these and took one out to use as a wiper, the unfortunate fact developed that it, too, left the wrong charge on the face plate of his helmet. He could see the clear, smooth plastic of the bag as it passed across the plate, but the dust collected so fast behind it that he saw nothing of his surroundings. He reflected ruefully that the charge to be removed was now greater than ever. He also thought of using the map, until he remembered that he had put it on the ground and could never find it by touch.

"I never thought," Shandara remarked after another lengthy silence, "that I'd ever miss a damp rag so badly. Blast it, Ridge, there must be *something.*"

"Why? We've both been thinking without any result that I can see. Don't tell me you're one of those fellows who think there's an answer to every problem."

"I am. It may not be the answer we want, but there is one. Come on, Ridge, you're the physicist; I'm just a high-priced picture-copier. Whatever answer there is, you're going to have to furnish it; all my ideas deal with maps, and we've done about all we can with those at the moment."

"Hm-m-m. The more I think, the more I remember that there isn't enough fuel on the moon to get a rescue tractor out here, even if anyone knew we were in trouble and could make the trip in time. Still—wait a minute; you said something just then. What was it?"

"I said all my ideas dealt with maps, but—"

"No; before that."

"I don't recall, unless it was that crack about damp rags, which we don't have."

"That was it. That's it, Shan; we don't have any rags, but we do have *water.*"

"Yes—i n s i d e our spacesuits. Which of us opens up to save the other?"

"Neither one. Be sensible. You know as well as I do that the amount of water in a closed system containing a living person is constantly increasing; we produce it, oxidizing hydrogen in the food we eat. The suits have driers in the air cycler or we couldn't last two hours in them."

"That's right; but how do you get the water out? You can't open your air system."

"You can shut it off, and the check valve will keep air in your suit—remember, there's always the chance someone will have to change emergency tanks. It'll be a job, because we won't be able to see what we're doing, and working by touch through spacesuit gauntlets will be awkward

as anything I've ever done. Still, I don't see anything else."

"That means you'll have to work on my suit, then, since I don't know what to do after the line is disconnected. How long can I last before you reconnect? And what do you do, anyway? You don't mean there's a reservoir of liquid water there, do you?"

"No, it's a calcium chloride drier; and it should be fairly moist by now —You've been in the suit for several hours. It's in several sections, and I can take out one and leave you the others, so you won't suffer from its lack. The air in your suit should do you for four or five minutes, and if I can't make the disconnection and disassembly in that time I can't do it at all. Still, it's your suit, and if I do make a mistake it's your life; do you want to take the chance?"

"What have I to lose? Besides, you always were a pretty good mechanic—or if you weren't, please don't tell me. Get to work."

"All right."

As it happened, the job was not started right away, for there was the minor problem of finding Shandara to be solved first. The two men had been perhaps five yards apart when their face plates were first blanked out, but neither could now be sure that he hadn't moved in the meantime, or at least shifted around to face a new direction. After some discussion of the problem, it was agreed that Shandara should stand still, while Ridging walked in what he hoped was the right direction for what he hoped was five yards, and then start from wherever he found himself to quarter the area as well as he could by length of stride. He would have to guess at his turns, since even the sun no longer could penetrate the layer of dust on the helmets.

It took a full ten minutes to bump into his companion, and even then he felt undeservedly lucky.

Shandara lay down, so as to use a minimum of energy while the work was being done. Ridging felt over the connection several times until he was sure he had them right—they were, of course, designed to be handled by spacesuit gauntlets, though not by a blindfolded operator. Then he warned the cartographer, closed the main cutoffs at helmet and emergency tanks to isolate the renewer mechanism, and opened the latter. It was a simple device, designed in throw-away units like a piece of electronic gear, with each unit automatically sealing as it was removed—a fortunate fact if the alga culture on which Shandara's life for the next few hours depended was to survive the operation.

The calcium chloride cells were easy to locate; Ridging removed two of the half dozen to be on the safe side, replaced and reassembled the renewer, tightened the connections, and reopened the valves.

Ridging now had two cans of calcium chloride. He could not tell whether it had yet absorbed enough water actually to go into solution,

though he doubted it; but he took no chances. Holding one of the little containers carefully right side up, he opened its perforated top, took a specimen bag and pushed it into the contents. The plastic was not, of course, absorptive—it was not the first time in the past hour he had regretted the change from cloth bags—but the damp crystals should adhere, and the solution if there was any would wet it. He pulled out the material and applied it to his face plate.

It was not until much later that he became sure whether there was any liquid. For the moment it worked, and he found that he could see; he asked no more. Hastily he repeated the process on Shandara's helmet, and the two set out rapidly for the rim. They did not stop to pick up camera or map.

Travel is fast on the moon, but they made less than four hundred meters. Then the face plates were covered again. With a feeling of annoyance they stopped, and Ridging repeated the treatment.

This time it didn't work.

"I supposed you emptied the can while you were jumping," Shandara remarked in an annoyed tone. "Try the other one."

"I didn't empty anything; but I'll try." The contents of the other container proved equally useless, and the cartographer's morale took another slump.

"What happened?" he asked. "And please don't tell me it's obvious, because you certainly didn't foresee it."

"I didn't, but it is. The chloride dried out again."

"I thought it held onto water."

"It does, under certain conditions. Unfortunately its equilibrium vapor pressure at this temperature is higher than the local barometer reading. I don't suppose that every last molecule of water has gone, but what's left isn't sufficient to make a conductor. Our face plates are holding charge again—maybe better than before; there must be some calcium chloride dust on them now, though I don't know offhand what effect it would have."

"There are more chloride cartridges in the cyclers."

"You have four left, which would get us maybe two kilos at the present rate. We can't use mine, since you can't get them out; and if we use all yours you'd never get up the rim. Drying your air isn't just a matter of comfort, you know; that suit has no temperature controls—it depends on radiation balance and insulation. If your perspiration stops evaporating, your inner insulation is done; and in any case, the cartridges won't get us to the rim."

"In other words you think we're done—again."

"I certainly don't have any more ideas."

"Then I suppose I'll have to do some more pointless chattering. If it gave you the last idea, maybe it will work again."

"Go ahead. It won't bother me. I'm going to spend my last hours cursing the character who used a

different plastic for the face plate than he did for the rest of these suits."

"All right," Tazewell snapped as the geophysicist paused. "I'm supposed to ask you what you did then. You've just told me that that handkerchief of yours is a good windshield wiper; I'll admit I don't see how. I'll even admit I'm curious, if it'll make you happy."

"It's not a handkerchief, as I said. It's a specimen bag."

"I thought you tried those and found they didn't work—left a charge on your face plate like the glove."

"It did. But a remark I made myself about different kinds of plastic in the suits gave me another idea. It occurred to me that if the dust was, say, positively charged—"

"Probably was. Protons from the sun."

"All right. Then my face plate picked up a negative, and my suit glove a positive, so the dust was attracted to the plate.

"Then when we first tried the specimen bag, it also charged positively and left negative on the face plate.

"Then it occurred to me that the specimen bag *rubbed by the suit* might go negative; and since it was fairly transparent, I could—"

"I get it! You could tie it over your face plate and have a windshield you could see through which would repel the dust."

"That was the idea. Of course, I had nothing to tie it with; I had to hold it."

"Good enough. So you got a good idea out of an idle remark."

"Two of them. The moisture one came from Shan the same way."

"But yours worked." Ridging grinned.

"Sorry. It didn't. The specimen bag still came out negative when rubbed on the suit plastic—at least it didn't do the face plate any good."

Tazewell stared blankly, then looked as though he were about to use violence.

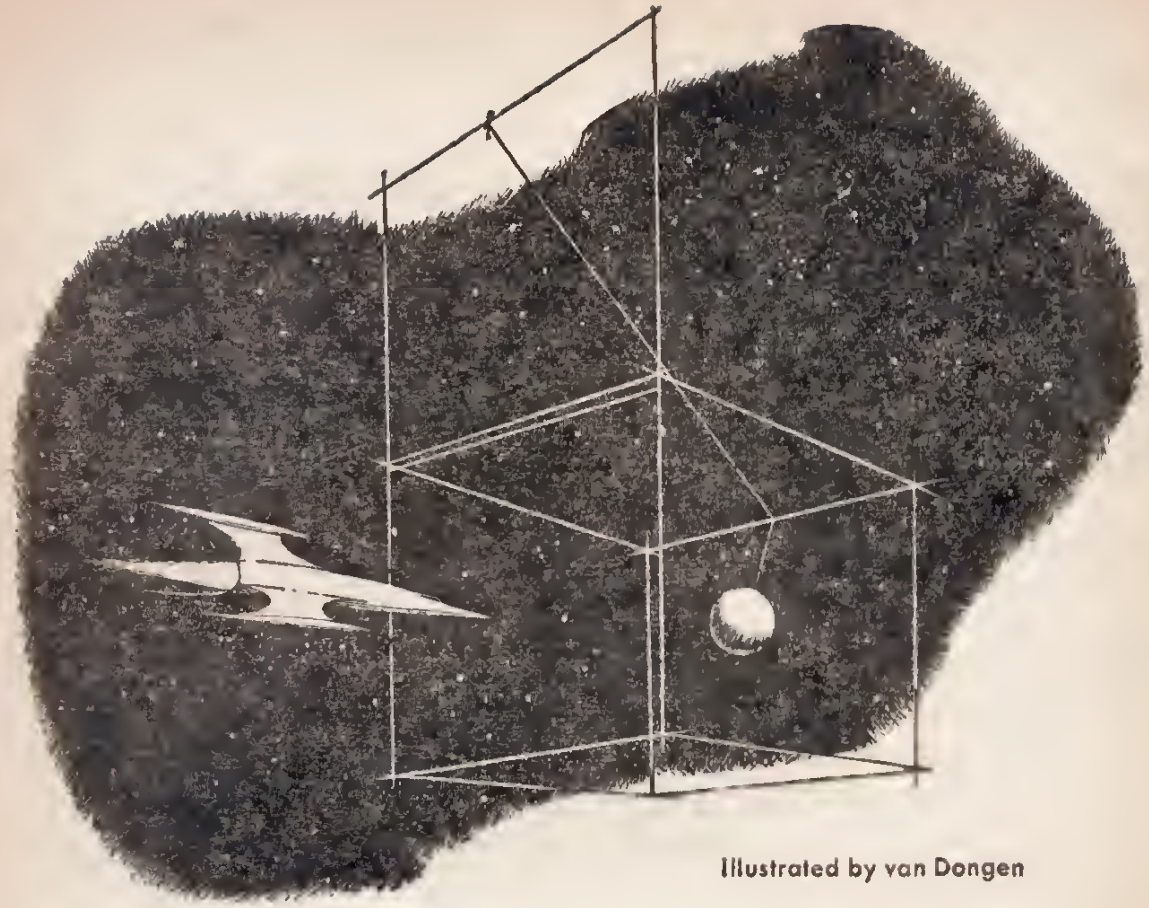
"*All right!* Let's have it, once and for all."

"Oh, it was simple enough. I worked the specimen bag—I tore it open so it would cover more area—across my face plate, pressing tight so there wouldn't be any dust under it."

"What good would that do? You must have collected more over it right away."

"Sure. Then I rubbed my face plate, dust rag and all, against Shandara's. We couldn't lose; one of them was bound to go positive. I won, and led him up the rim until the ground charge dropped enough to let the dust stick to the surface instead of us. I'm glad no one was there to take pictures, though; I'd hate to have a photo around which could be interpreted as my kissing Shandara's ugly face—even through a space helmet."

THE END



Illustrated by van Dongen

MIND FOR BUSINESS

BY ROBERT SILVERBERG

Routine works just fine for a well-run military system...until someone with a cockeyed way of doing business comes along.

Once it was clear to both of them that the little ship was permanently disabled, Connelly turned to the alien and grinned in open appreciation. "Very clever, you Nidlans. This is the neatest trap I've seen yet."

He stared at the screen, looking out at the bleak, wind-swept surface of the small, lonely planet, and then glanced back at the Nidlan. The alien was slouched comfortably in the far corner of the small cruiser, beaming with an inward glow of self-assurance.

"My people don't like it when Earthmen kidnap Chiefs of Staff,"

the Nidlan said. "They take steps."

Connelly nodded. "Very respectable steps, too. I was so busy hurrying away from Nidla with you that I let the trap take me. It must be a gigantic force field, set to draw in any ship that comes by without taking the right precautions. Eh?" He cocked an eye at the Nidlan. "What do you think, Lomor?"

"I have no opinion on the matter," the other said, shrugging. "All that concerns me is the fact that you've abducted me from my home world, and that I'll shortly be rescued." The Nidlan got up and crossed the cabin of the ship to the viewscreen, walking unsteadily. The ship had ploughed into the mountainside at about a forty-five-degree angle, and the gyros had unaccountably stabilized things some ten degrees out of true, which made motion difficult. The alien peered pensively out at the unappetizing view.

"Nice," Connelly said.

"Very nice," said the alien smugly. "Your little experiment in espionage didn't seem to work very well, did it, Connelly?"

"Guess not," the Earthman replied laconically. "We're stuck here —both of us—half a light-year from the Nidla system."

"Yes," said the Nidlan. "My people will be here as soon as they discover the trap's been sprung. We've anticipated attempts by Earthmen to penetrate our defenses, and we've studded the local area with these . . . ah . . . mousetraps. It's a fine counter-espionage system."

"Oh, yes," Connelly agreed. "A very fine system." He moved to the control board and started to press buttons. The Nidlan peered close, trying, without success, to read the unfamiliar Terran designations on the controls.

"What are you doing?" he asked finally.

"Shifting the guns around so they face front," Connelly explained. "By the time I get through, this place is going to be a fortress. With those rocks behind us and that plain out in front, you're not going to be as easy to rescue as you've been thinking, Lomor." He glanced meaningfully at the alien, who frowned.

"You Earthmen," Lomor said in annoyance. "Always making things so difficult."

Connelly smiled quietly to himself and went right on punching keys. Through the viewscreen the Nidlan saw the small but effective guns of the little cruiser rapidly lowering into the positions Connelly had set up.

The ship was backed up against a wall of stone, and armed to the teeth. The Nidlan shook his head petulantly. The Earthmen always seemed to have a trick or two left in the bag, at all times. That was how Connelly had been able to descend on Nidla in a one-man ship and blithely carry off so important a personage in the Nidlan military hierarchy as Lomor dal Govnim, and that was how Connelly had escaped from the Nidlan system so easily.

Now, true enough, Connelly was

trapped—had been snared, through blind luck, by a cosmic mousetrap laid by Nidla. The traps could be avoided, as Lomor knew quite well. Only a blunder had gotten Connelly trapped, and it was refreshing to know that the Earthmen *could* blunder.

But they had an ugly way of turning their biggest blunders into their most impressive triumphs. That was the trouble with them.

"Finished?" Lomor asked.

Connelly nodded. "I think so. When your rescuers come to fetch you, they'll have a fine fight on their hands." He ran a hand along the back of his neck. "How long did you say it would be before they'll notice the trap's been sprung?"

"Not very long," said Lomor coldly. The Nidlan was tense and abrupt; Connelly's bland confidence at all times—the very factor that had led Lomor to fall for him in the first place—was now almost unbearably annoying. Connelly had a terrifying air of serenity that made Lomor wonder whether letting the snare take him *had* been a blunder for the Earthman, or whether perhaps this was all a deliberate maneuver, part of some unknown larger plan.

"You think we've got a couple of days?" Connelly asked.

"I don't know," said Lomor.

Connelly grinned. "You're just not telling. But I don't mind. It's natural enough." He turned to the subradio and rapidly started setting up co-ordinates. After a moment or two, the machine began to glow and hum.

"Now what are you doing?" Lomor asked.

"I'm going to get us taken off this forsaken place," Connelly said. "By the *right* people."

The red light above the set indicated that the subradio was functioning. Connelly glanced up quickly to check it, grinned infuriatingly at the Nidlan, and cleared his throat.

Then he proceeded to dictate an S.O.S., on the widest beam that was open. He beamed to the whole universe the naked fact that he, Paul Connelly, Earthman, had been caught in a Nidlan trap on some uninhabited planet, that his ship had crashed and was useless, and that he was awaiting rescue.

He went on to add a detailed set of instructions for landing and blasting off from the planet without getting ensnared in the Nidlan trap.

Connelly repeated the message twice, then cut off the machine. He whirled on the swivel chair and met Lomor's horrified glare with a calm smile.

"How do you know how the trap operates?" Lomor demanded.

"You've just blundered, friend," Connelly told him coolly. "I might have been only bluffing with those instructions, and now you'd have confirmed my guess about the trap. Except," he added, seeing the color rise on the Nidlan's face, "that I *did* know how your trap works. After all, I fell into it."

"Why? Deliberately?"

Connelly shrugged his shoulders. "Oh, no—not at all. But let's assume it was a blunder on my part. If it was, at least I've profited by my blunder to the extent of knowing how I got caught. Let's see you do likewise."

The Nidlan shook his head angrily, and repressed a biting comment. It didn't do any good to insult the Terrans; they just grinned.

"That S.O.S.," Lomor said, "did it go on wide-beam?"

"The widest there was," said Connelly. "*Someone's* bound to pick it up."

Someone did.

The Nidlans, being closest, caught it first. The message reached the office of Drilom dal Kroosh, Lomor's first assistant—and, in Lomor's unfortunate absence, the acting head of the office—just about the same time that the news of the trap-springing did.

Drilom looked up at the young officer who had brought him both dispatches.

"They both just came in, eh?"

"Both of them," the subaltern said. "One right after the other."

Drilom chewed a worn pencil-stub. "Hm-m-m. This Earthman Connelly is proving to be an intolerable nuisance. First he was crude enough to kidnap the Chief of Staff out from under our noses, for who knows what purposes of his own, and now that we've caught him he's been so crass as to send out a wide-beam S.O.S. The whole galaxy will know about the Earth-Nidla friction at this rate."

"Yes, sir," the underling said.

Drilom glared at him. "Don't agree with me!"

"No, sir," said the subaltern helplessly.

Drilom ignored him. He stared down at the two dispatches for a long moment, toying with the gold braid on his uniform-sleeves, while he groped for the snap decision his military culture required of him. Finally he looked up and snapped, "Get me Konno dal Progva."

"At once, sir."

Drilom's second-in-command arrived a moment later. Drilom hastily filled him in on the happenings.

"I see," Konno said sagely, when Drilom was through. Konno was a wiry, shriveled-up Nidlan with a much-respected talent for strategy. "The Earthman is holed up on our trap planet—presumably with Lomor in his custody."

"Right."

"And presumably, also, a ship from Earth has picked up the S.O.S. and is heading for the planet, there to rescue Connelly and gaily carry Lomor back to Earth—where they'll pick his brains thoroughly."

Drilom nodded grimly. "That's the picture," he said.

Konno wrinkled his sharp nose into a grimace of concentration. "If we send a Nidlan military expedition there to grab Connelly, we're liable to arrive at the same time the Earthmen do—which will touch off a quarrel and possibly catapult us

into conflict with Earth before the schedule allows."

Sweat was pouring freely down Drilom's face. "I'm desperate, Konno. What am I supposed to do? If I pass the buck upstairs, it'll look bad for me, and—"

The other held up a hand. "Peace, Drilom. Look—suppose we send a decoy."

"Decoy?"

"Sure. Suppose we send a ship of Earth design—say, one of those small Terran merchant ships we trapped last month—manned by a crew of young men hand-picked for Terran appearance. Those Terran ships all look alike anyway." His beady eyes gleamed brightly. "Suppose we were to do that—pass ourselves off as merchantmen. If we get there before the Earth rescue party did, and if we could persuade Connelly that *we* were the true rescuers—"

Drilom dal Kroosh stared around the cabin of the stolen Earthship, transfixing first one, then another of his crew with angry, expressive glances. He hadn't expected, when he had broached the plan to his superiors, to be ordered to head the bogus rescue party himself.

But there hadn't been any way out of it, and so he had collected his crew—all strapping, six-foot Nidlans, carefully chosen for the degree they approached the theoretical Terran norm of appearance—and had taken off for the little planet. He'd set up the nullifier patterns as instructed—the Earthman, he admitted wryly, had hit on exactly the proper method of circumventing the trap and had explained it accurately enough in his S.O.S., for all to hear—and had landed.

The ship was now standing in the sandy plain that faced the vaulting pile of rocks amid which Connelly's ship had crashed. Drilom, staring into the screen, thought he could make out the dim, coppery gleam of the distant Terran ship, but he wasn't sure.

He turned to the chief radioman, a spare-limbed Nidlan named Pribor. "Make contact with Connelly," he ordered brusquely, and resumed his nervous pacing up and down the cabin.

While Pribor fiddled with the dials on the Earth-built radio, struggling manfully with the unfamiliar controls, Drilom turned to Huompor dal Vornik, the tall Nidlan standing at his side.

"I'm going to be down below watching from the monitor screen. If that Earthman ever got a sight of me, he'd know the game in a minute. It's all in your hands now."

Huompor saluted smartly. "Yes, sir."

"Remember," Drilom said anxiously, "you're an Earthman. The reason you got here so fast is you're the captain of a merchant vessel that plies the neutral area. Say as little else as you can—and make it quick. Once we get Connelly and Lomot aboard ship, we can drop the mas-

querade and head back to Nidla. Set?"

"Set, sir," Huompor replied.

"Ready to go, sir," called the radioman.

Drilom ducked down the hatch after scowling one last time at Huompor. He made his way to the monitor-screen on the lower level, and watched the whole thing from there.

He saw Connelly's face appear on the upstairs screen. The Earthman was young and mild-looking, with a lazy way about him of blinking his eyes that irritated Drilom considerably. Connelly didn't look clever enough to have caused all the difficulties he had. Drilom hoped he'd be unwary enough to fall for the Nidlan ruse. If Connelly somehow got back to Earth with Lomor, the consequences would be most unpleasant for Nidla's territorial ambitions.

Upstairs, Huompor dal Vornik stepped into the field of the screen and gave the standard Earthman salute.

"Lieutenant Connelly?"

"That's me," the Earthman agreed amiably.

"The name is Smith," Huompor said. "Captain of a merchantman in the vicinity."

"Oh?"

"We've intercepted your S.O.S.—we were in the neutral area on a trade run. Now, about this rescue," Huompor said a little too eagerly.

"You're going to rescue me?" Connelly asked.

"Why else would we undertake this maneuver? Now—the most efficient way to carry it out would be for you to abandon your ship and be picked up at—"

Connelly raised one hand. "Skip the rest, friend. It doesn't appeal to me." The screen abruptly went blank.

And a moment later, a golden blast of energy from Connelly's starboard guns raked across Drilom's bow, missing the ship by a comfortable margin but making things so hot inside that the cooling system overloaded and nearly short-circuited.

"Definitely hostile," Drilom said morosely. His ship was now at a safer distance from Connelly's, and he was contemplating the situation with gloomy detachment.

"What could that shot have meant?" Huompor asked. "Perhaps it was some sign of friendship among Earthmen."

Drilom nearly choked. "That shot could mean only one thing, even among Earthmen, young man: *Get away, and stay away.* I don't know what you did wrong, but he saw right through your act. Two sentences out of your mouth and he knew you were a fake."

"I don't see how," said Huompor. "It was one of my best impersonations," he said wistfully.

"Doesn't matter," Drilom said. "Connelly didn't fall for it. And Lomor's still in there."

One of the other crew members appeared at that moment, saluted, and said, "Sir, another ship's just arrived!"

"Where?"

"It's approximately four hundred meters closer to Connelly than we are. We picked it up on the radar screen about ten minutes ago. It went through the same nullifier pattern we did, and it seems to be the identical model that we're using."

Drilom frowned, unamused by the irony of the situation. "Identical? That means it must be the *real* Earth rescue ship!" He held his head. "Now we're in for it, if they find out what we're doing here. I hope this doesn't touch off the war ahead of time?"

"What do you suggest we do, sir?" Huompor asked.

"Just sit tight," said Drilom desperately. "Sit tight, and don't do anything. Come. Let's see what happens."

He walked to the nearest screen, and with trembling fingers brought it into focus.

The small, worthless sun that lit the nameless trap planet had long since set, but by the flickering green light of the planet's one moon Drilom could see the other ship. It was, indeed, identical—the very same model light cruiser that the Nidlans had used. It was planted on end at the edge of the desert.

Drilom called down to his radio operator, "Tune in and find out if they're saying anything!"

A moment later, the signalman shouted in return, "They're a Terran

merchant vessel! It's the real rescue party, all right!"

Drilom watched silently. He was waiting to see the figures of Connelly and Lomor leave the niche in the mountains and go to the Earth ship, and he wondered idly if there was any way of intercepting the pair as they crossed the desert. A minute passed, and suddenly the misty, moonlit plain, was illuminated by a crimson flash of brightness.

"I'll be cursed," Drilom said in quiet wonderment. "He fired on them, too."

All kinds of possibilities presented themselves now—the possibility that Connelly was insane, the possibility that Lomor had somehow gained control of the damaged ship, the possibility, always to be considered, that Connelly and the Terran ship were playing out some elaborate ruse for Drilom's benefit.

In the midst of his feverish speculations, Pribor broke in. Drilom looked up sourly at his signalman.

"Well, what is it?"

"We've just had a call from the Terran ship, sir. Their commander would like to meet with you. He suggests that you and four of your men go outside, and he'll do the same; you can meet halfway between the two ships."

Drilom's forehead wrinkled as he considered the proposition. Earthmen were, by axiom, not to be trusted—but yet, the proposal seemed to be made in good faith. Perhaps, he thought, the Earthmen were so bewildered by Connelly's reaction that they were genuinely at a loss, and wanted to talk the thing over with someone. Perhaps they thought Drilom's ship was from Earth; perhaps they knew the truth, and Drilom stood a chance of effecting a valuable compromise that would push him up a notch or two in the Nidlan hierarchy.

There was no way of telling. But it seemed safe to give it a try. "Tell him I accept," he said.

Later in the evening, Drilom and a small party suited up and made their way across the desert to the prearranged spot. They were armed to the teeth, with natural precaution.

The other delegation was there already. Drilom saw men much like himself, though they seemed to be bigger by a little, and behind them loomed a ship identical to his own.

The other commander was a deep-voiced man who introduced himself as Ledrash. Drilom could see nothing of him except dimly-glimpsed craggy features within the helmet.

"He fired on you," Drilom said. "That's what he did to us. I can't understand it at all."

"Neither can we," said Ledrash. "Here we came all the way off our trade run to get him off this lump of rock, and look at the way he greets us! Where are you from?" Ledrash asked.

"Earth," Drilom lied.

"We're both from Earth, then," Ledrash said. The two commanders stared stonily at each other. Drilom began to suspect something. Connelly

had fired on the second ship as well as his own. Could it be that Ledrash and his men were non-Earthmen too, carrying on the same sort of game for motives of their own? It was an idea, he admitted.

"It doesn't seem likely that Central would approve two rescue missions," Drilom ventured. "It seems to be a waste of crew time to send two ships to do a job that calls for one."

"I was just thinking along the same lines," Ledrash said ominously. "It's improbable that we're both from Earth."

"We came in good faith," Drilom said.

"So did we," said Ledrash. He crossed his thick-muscled arms, and Drilom caught the shadow of a somber smile behind his helmet. "One of us is lying."

Drilom looked uneasily at Ledrash's four men, and back at his own. It was an explosive situation, and he was navigating blindly, on sheer bluff. "If you're really Earthmen—" Drilom started to say, and then was interrupted. A member of Ledrash's crew who had been staring fixedly back of Drilom toward the mountains suddenly pointed up.

"Another ship, sir!" he shouted.

Ledrash whirled. "Where?"

The crewman gestured ineffectually. "There . . . there . . . just like ours," he said, struggling for words in his excitement. Finally he voiced what he was trying to say. "On the other side of the mountains—blasting off!"

Ledrash ran a few yards away for a better view, with Drilom right behind. The two commanders stared out blankly at the mountains, with the long, gradually dying scarlet trail of light hanging above the jagged peaks. A third ship had been there—and had left.

Ledrash turned slowly. "Get back to the ship and tell Dorni to try Connelly on the radio," he said. "On the double."

The signalman trotted off toward Ledrash's ship, while the little group remained frozen in the desert, waiting. A few minutes later the crewman returned. "There's no answer, sir. His radio's silent."

Ledrash sat down heavily on a wind-sculptured rock. "No answer?"

"No, sir."

Drilom moistened his dry lips. "He got away."

Ledrash nodded curtly. "Suppose we go over to my ship and talk this over," he suggested.

Drilom started to suggest his own ship as a preferable alternative, and stopped. There was nothing to fear from Ledrash. Drilom felt a curious feeling of comaraderie toward the other commander starting to grow within him. He had been flummoxed, all right—but so had Ledrash, and it made Drilom feel better to know he had company. The truth was clear, now: Ledrash was no more of an Earthman than he was. And while they held each other at arm's distance, the real Earthmen had come and gone.

They climbed the catwalk in silence

and entered Ledrash's ship. It was, Drilom noted, the same model precisely as his own. They got out of their suits.

The other men, Drilom observed, were humanoids, and could pass for Earthmen or Nidlans easily. They were big, heavy-boned, dark-skinned.

Ledrash ran a hand through his hair. "We've been had," he said hoarsely. He smiled feebly at Drilom. "We've been taken—both of us."

"Let's check, first," Drilom insisted.

"How?"

"By going over to Connelly's ship," said Drilom.

Ledrash scowled, and finally pointed to two of his men. "Suit up, both of you. Take two of these"—indicating Drilom's men—"and get over there for a look-see."

Drilom nodded at two of his men. "Go with them," he ordered. "And make it fast."

An anxious few minutes passed, while the four crewmen jogged across the desert. Drilom lost sight of them as they entered the shadowy foothills of the mountains, and began to pick their way through the rocks to Connelly's ship.

Time passed, and the tension started to pull tight. Finally, after what seemed like hours, the men returned.

"Well?" Drilom demanded, knowing the answer. "Anything there?"

"Not a soul," said one of the men. "They left the air lock open. The ship's deserted."

"He got away, all right," said Ledrash.

"*Both* of them did," Drilom corrected.

"Both? I thought it was just the one Earthman."

"No," Drilom said. "Connelly had an influential Nidlan aboard as his prisoner."

"Oh." They grinned sheepishly at each other, each aware that he had made a blunder. Finally Drilom said, "You're not an Earthman, are you?"

Ledrash shook his head. "No use keeping up the pretense when the truth is obvious to both of us. I'm from Corilan. And I'll bet you're a Nidlan."

Drilom nodded. The two of them sat there in the Corilano ship, contemplating each other. It made sense, now. Corilan was a powerful planet located almost centrally between Earth and Nidla. Nidlan espionage had been aware for some time that the Corilani had formulated a series of actions which might conceivably rebound to the greater profit of Corilan, in the event of disagreements between the other two major powers of the galaxy.

So they had picked up Connelly's S.O.S., and the same plan had occurred to them as to the Nidlans. Fool Connelly, and spirit him off. Only it hadn't worked.

And his S.O.S. had also been picked up by real Earthmen.

"How come you came out there?" Drilom asked.

"We wanted the Earthman," said Ledrash. "And you?"

"The same."

"I won't probe any further," Ledrash said. "The situation's delicate enough as it is."

Drilom smiled at the big, square-hewn Corilano. "I'll say. When that Earthman gets back to his system with Lomor—with our Chief of Staff, that is—we won't have a military secret left worth hiding."

"How sad," the Corilano said. "How very sad for Nidla." He stood up and walked across the cabin. "We are aware that you plan a conflict with Earth. This will make it hard for you."

"Don't speak of it," Drilom said. "Let's keep *some* secrets from each other, shall we? Our planets are theoretically rivals, you know."

"What does that matter to us?" said Ledrash. He turned and faced the Nidlan squarely. "We are both human beings," he said with obvious feeling. "We have something in common that binds us together—we have both been badly fooled by the Earthmen."

"True enough," Drilom said. He smiled and extended a hand. "Comrades in adversity," he said.

They fell silent for a while, as the sun began to rise. It was an unimpressive sunrise; the star that lit the trap planet was scrawny and definitely third-rate, and it cast a sickly, yellowish morning glow. Drilom suddenly realized that he had been up all night, and that he was terribly tired.

"Let's go back to my ship for a while," Drilom suggested.

The Corilano commander nodded. "Good idea."

They covered the sands in silence for a while, and then Drilom said, "It's very strange, you know."

"What is?"

"Look: you and I came down separately, in identical ships, and went through the same nullifying pattern to avoid a trap. And he fired on both of us almost at once."

"While the true Earthmen," Ledrash said, "did exactly the things we did, in the very same sort of ship, looking exactly the way we do—and Connelly went with them."

"It doesn't figure," said Drilom worriedly, as they approached the catwalk of his ship. "The three ships went through identical patterns of action. Only the motives were different, not the patterns we produced. He had no way of telling that. And yet he knew the real rescuer from the phonies."

"And yet he knew," the Corilano repeated. "How?"

Drilom hoisted himself into the air lock, and Ledrash followed. They stripped off their suits and Drilom took a bottle from a cabinet. He poured drinks for both of them.

"This is why I suggested we come over," he said. "We need these."

As he raised the drink to his lips, Drilom heard the excited rapping of Signalman Pribor. "Come on in," he said.

Pribor burst into the room, recoiled at the sight of the burly Corilano sprawled out in a chair, and at Dril-

om's impatient gesture said, "I've just been checking the tapes on the monitor pickup, sir. And it seems we've recorded the conversation that took place between the third ship and Connelly."

Drilom darted a glance at Ledrash and snapped, "Play it at once!"

Pribor inserted the tape in a playback and waited. In a moment, the warning hum appeared, and then voices.

"Connelly?" said the voice of the Earthship's commander.

"That's right," they heard Connelly's familiar voice say.

"The name is Danvers. Captain, Merchant Service. We were over at Mokrin on our regular run when we got your message. Right now we're just outside landing range of this trap planet you're on. Want us to come down?"

"Sure do," said Connelly. *"I'd like to get going."*

There was a long pause. Then, finally, Captain Danvers said, *"Couple of details first, Connelly."*

"Shoot."

"This little jaunt is costing us good money. What's the chance of salvaging your ship?"

"The ship's pretty battered," Connelly said.

"Um-m-m. Maybe we'd better call the Patrol, instead, then. Unless you're sure your department can handle the charge on this thing. Our budget can't take much more fuel expenditure."

"Don't worry," Connelly said at once. *"It'll be on 'Deep Info'—You'll come out ahead.*

"Good enough," said the merchantman captain. *"We'll be right down."*

"Glad to hear it," Connelly said. *"And glad to hear the voice of a genuine Earthman again—the kind that knows how to haggle!"*

Drilom pounced on the playback and shut it off angrily. "There's our mistake," he snapped.

"Where?"

"Attitudes. We had the external pattern down fine—but not the way of thinking. That's why he saw through us. We went about negotiations the way soldiers would, brisk, efficient, to the point. A *real* merchantman would bargain. He wouldn't want to get mixed up in this except for a price."

Ledrash noddde bleakly. "What are you going to do?"

"Go back home and file a report," Drilom said in a hollow voice. "We're not ready to start trouble with these Terrans—not ready at all."

"You'll have to learn some of their tricks first," Ledrash suggested sardonically. *"Then* fight them."

Drilom shook his head. "No," he said. "It won't work. By that time, they'll have half a dozen new ones. We'll never beat them that way." He smiled suddenly. "But maybe—some day—we'll be smart enough not to *need* to beat them!"

THE END

THE REFERENCE LIBRARY

BY P. SCHUYLER MILLER

WHODUNIT?

There is an impression abroad in the land that we have been living through the Decline of Science Fiction, with the Fall just around the corner and the Dark Ages up the street somewhere. Magazines have been crumpling up with a regularity that hasn't been seen since Hugo Gernsback was building 'em and wrecking 'em almost by the clock, and significantly it's been the whole body of middle-of-the-road magazines that have folded, notably those descendents of Gernsback's own *Science Wonder Stories, Thrilling Wonder* and *Startling,* from which many if not most of the recent crop of paper-backed reprint "novels" came. The "big three"—this magazine, *Galaxy,* and *Fantasy and Science Fiction*—seem still to be strongly entrenched, *If* is leading a small pack of close contenders, and one newcomer, *Infinity,* seems to be making a terrific try to catch up with the pack.

In the book field, things are even worse. If we had not extended the scope of this department to bring in the paper-backs, and didn't go out of our way to hunt for borderline fiction and non-fiction, there

simply would not be a monthly "Reference Library" by now—at least, not one of the size you've been getting for the last couple of years. The specialty publishers are frankly fighting for their corporate lives, and the "big" publishers, who for a while were shoving like mad to climb on the s-f bandwagon, are now backing away just as violently.

This state of affairs isn't really new. It was in the halls and very much on the floor at the World Science Fiction Convention in Cleveland, a year ago. It thrust itself into every other conversation at last week's Midwestcon, in Cincinnati. It will undoubtedly be the specter at the World Convention in New York, a couple of weeks after this column appears. And most of the discussion seems to revolve around two questions: Is this a natural death, or is science fiction being murdered? If it's murder, who is guilty?

Let's take the case for murder first. I argued, perhaps not too coherently, in Cleveland last year that the crime is suicide—that we've been guilty of writing and editing in circles, as a game for our own amusement, and thereby freezing out the great host of young people and casual readers who used to be won into science fiction. I was promptly ruled out of court by bumping into two Pittsburgh fans, complete strangers—now very good friends—who *had* been won to s-f by what they found in the magazines and the pocket books. Though, needless to say, they are unusually intelligent and perceptive people like all Pittsburgh fans . . .

Sam Moskowitz was also rumbling in Cleveland along the "lost sense of wonder" lines that he's expressed often before. It's a corollary of my clique argument, or mine is a corollary of his, and as you know I rejoice from time to time when something of the old flavor shows up in a book by Andre Norton or Edgar Pangborn or someone else.

I didn't have a chance to blaze away with the other barrel of my scatter-gun, and can't now, because it isn't loaded. At least, I don't have the facts and figures to back up an impression that something is seriously wrong with distribution, not only of science-fiction magazines but of all minor general-fiction magazines outside the "big slick" category. I have seen one month's issue of *Astounding* brought to my corner drugstore just three days before the next month's issue came out. There is no way of telling, from month to month, which of the three drugstores in the neighborhood will have which of the leading magazines—and finding the minor ones at all is likely to involve hunting all over the city. The big Thirtieth Anniversary issue of *Amazing* never appeared at all in most of the stores I frequent. The one department store book department which maintains a good magazine section can't get more than two or three copies of *F&SF*—and you might know that the cut-off came

with the very issue that reprinted one of my last stories!

Something is seriously wrong with magazine distribution, but I don't know what it is or how to cure it. I hope someone does, because you can't go on publishing the best stories in the world if no one gets a chance to buy them.

Still at Cleveland, Steve Takacs, proprietor of New York's principal if not only bookstore specializing in fantasy and science fiction, made a pretty convincing case for murder by one black-hearted, money-mad villain: Doubleday's S-F Book Club. His argument: fans know that the best hard-back science fiction books are going to wind up in Book Club editions for a dollar, so they're not going to pay $3.00 or more for the original edition. The same thing, I know from experience, holds for paper-backs: if you're not concerned about building a collector's library, you can get ten p-b's for the price of one new hard-cover book.

A new villain was fingered just before the Cincinnati convention, in an article by Robert Bloch, in that unusually professional fanzine, "Inside" (twenty-five cents an issue, five for one dollar, from Ron Smith, 611 West 114th Street, Apt. 3d-310, New York 25). It was written two years ago and withheld by the author because he was afraid it would sound like sour grapes. His villain: Hollywood. And because, short of the distribution problem, this affects far more people more directly than any of the other causes I've mentioned, the argument is by far the most convincing.

Essentially, Bob Bloch says this: vaulting onto a supposed bandwagon with unbuckled galoshes, the motion-picture industry has produced such a quantity of puerile bosh in the name of science fiction, that that name is now "muck" to the movie-going public. And since most people have gained their impressions of science fiction from these inept, ridiculous films—and their counterparts on television—they are avoiding like poison anything that uses the same name. Books, magazines, more movies—and especially books.

From several sources, in Cincinnati, there was confirming evidence. "Science fiction," it seems, is now a bad word with the major publishers. Booksellers won't touch it; book-buyers won't look at it; even the remainder houses are giving it a fishy glance. Indirectly, I can confirm this. I've been buying *Publishers' Weekly*, the main book-trade journal, with the idea of learning in advance what science fiction and related titles are coming. But for a good many months, now, it hasn't worked: publishers simply are not taking space in *P.W.* to advertise their science fiction, and some of them seem to have dropped it completely. Not only that: some of them very definitely *do not want a s-f book identified as such* in a column like this, which may explain why I'm having a harder and harder time getting the new

books that are published, before they show up in the bookstores.

I don't know how many science-fiction movies you've seen in the last year or so. I try to keep up with them, but the low-budget ones never show at all except in the drive-in and neighborhood theaters and the high-budget ones seem to stay in the "good" houses for about a week. With one or two very minor exceptions, the results have range slightly upward from terrible. Or, to be kinder than Bloch—who after all does have a history of devil-worship and Jack the Ripper somewhere in his family tree—what Hollywood was turning out, often at great expense, was stuff that would have been routine twenty years ago.

In reviewing "Forbidden Planet," the novelization of a movie script, you'll recall that I predicted it would turn out to be a good formula s-f film. The plot was corn, the "science" was gobbledygook, but the thing was presented in one long series of potentially terrific visual effects—and that precisely describes the movie. I don't believe the technical effects have been equalled on the screen. "Robby," the robot, is the only real character in the thing—and a stand-out character in science-fiction films for all time. The subterranean machine-world of the Krel is breath-taking—I'm told that some of Disney's best people worked on the effects. And, aside from some very un-horrible claw-prints—whose casts bear no resemblance at all to the prints in the sand—the id-monster is one of the most horrifying things you've seen on the screen, simply because it is left partly to the imagination, never wholly seen. But—and here Bloch's point is dramatized—all this, including a budget that could afford Walter Pidgeon as the morbid Morbius, is wasted on as unreal, cornball-juvenile a plot as you'd find in a "Boys' Own" weekly of about 1910.

About a week after "Forbidden Planet" arrived downtown, Walter Wanger's production of the Jack Finney book slipped into some of the neighborhood houses as "Invasion of the Body Snatchers." In this, you'll recall, seeds from space grow into pods which in turn develop inside themselves absolute replicas of earthly life-forms, both animals and human. This is almost good: it should be, because for the most part it's pure escape-from-the-monster stuff, with only one or two very dimly lit, very hazy shots of the pods growing people. In the hands of the Lewton-Tourneur team who turned out a run of terrific mystery-horror pix for RKO, it might have been a memorable picture. But you'll notice that Bloch's point is strengthened, not weakened, by both these pictures: they are strictly BEM and horror stuff, without anything but technical excellence to put them in the class of "good" s-f.

All these special factors—cliquish writing, distribution troubles, book clubs, Hollywood—play their part in crippling science fiction as we know

it. But looking at it close up, we fail to see that these may be merely added troubles piled on top of a disease that is afflicting the entire publishing industry. You'll find some of these ills discussed in a symposium in the June 2nd *Saturday Review,* and especially in the first of the three articles, "Can Johnny's Parents Read?" by Gordon Dupee, president of the Great Books Foundation.

What Mr. Dupee is saying is that —for whatever reason—reading is losing its importance in our American culture. (And I mean "culture" in its anthropological sense, as the sum-total of the things we do and think and believe, not in any old line stiff-collar connotation.) He quotes some survey data: If we're college graduates, more than a quarter of us haven't opened a book in the last year. Twenty years ago, poll-takers of the American Institute of Public Opinion found twenty-nine per cent of all adults reading a book at the moment they were interviewed. Today this figure has dropped to seventeen per cent. And only thirteen per cent of the American people take books out of a public library: this, at a time when our library facilities are woefully inadequate.

I'm sure none of us, in our most hashish-inspired dreams of glory, has even seen science fiction swallowing up all other fiction and becoming *the* sole literature of the future. We have looked on it as a vigorous, healthy, minor branch which blossoms in ways that no other branch does or can. The branch can be attacked by pests, or wither away—but if the whole tree dies, it's sure to go.

Look at the detective-story field. I love 'em—read all I can lay my hands on, if Boucher says they're good—but I don't buy them. I'm told that almost the entire edition of any mystery goes to the rental libraries, with a few to public libraries. That's where I get mine, and I am usually at the end of a long list looking for new books by reliable authors. Here, then, is what has become almost a major branch of modern fiction, thriving without any sales to speak of to individuals. Are we expecting too much of science fiction, in demanding that it do what the mystery field can't?

I know we're special: we're a family, with the good old habit of holding family reunions, and gossiping about Uncle Willie's big binge or what happened between Cousin Edie and the meter-reader. We're collectors, of books or magazines or both. I'm one myself, with—I hope —just about every issue of every American s-f magazine since April, 1926, when *Amazing* burst on a delighted world. But at no time in those thirty years have I had the room to put that collection out where I could enjoy and use it—which is one reason I'm repeatedly caught out, by not being able to spot the magazine source of a new hardback book. Today, according to the survey Mr. Dupee quotes, *forty-two per cent of all American houses have no bookshelves of any kind!*

Are paperbacks the answer? Not when you reflect that seventy-eight per cent of all the p-b's sold, including all the sex and sadism, are bought by nine per cent of the buyers.

We are a small fraction of a small segment—the reading segment—of the American public. For whatever reason, that segment is getting smaller, and we are at the end that feels the squeeze most, the end at which, from the point of view of publishing economics, the first cuts have to come. That's what we're feeling now. Maybe the main trend will change, but it's real: I feel it in myself, and I don't have TV, don't use radio or records much. Once I read all of all the current science-fiction magazines, plus all I could find in other magazines, and at the same time managed to keep up with the best current novels, some other books, and a fair amount of archeology and history. Now most of my reading is done for this department, with some purely recreational mysteries sandwiched in. The last best-seller I recall reading was "Auntie Mame." A serious book, fiction or not, requires two or three days solid attention which I just don't seem able to give it. I have my own special reasons, of course, but I think the trend is in there too, and that this difficulty in focusing attention is part of the tension of our times and our society. Let it break, let the mood be right, and I can sail through the toughest book as well as I ever could—but it doesn't break as often as it used to.

Who killed science fiction? The real question is, who or what is killing reading? We are suffering from the same thing that is hurting all American book publishing, only we're hurt a little more than most because we're more exposed and more expendable. The outposts go first.

* * * *

Long as this is, I can't stop without warning you not to miss the 14th World Science Fiction Convention, at the Biltmore Hotel in New York, running from Friday, August 31st, through Labor Day, September 3rd. Arthur C. Clarke is Guest of Honor, and Dave Kyle is organizing a program that will be out of this world. Take that literally, please. For $2, sent to P.O. Box 272, Radio City Station, New York 19, N. Y., you will become a member of the newly incorporated World Science Fiction Society which gives continuity to these annual assemblies of pros, fans and BEMs. You'll get the *Journal* with its advance announcements—third due any day, as I mail this—and a lot more. I, for one, am devoting my 1956 vacation to the Convention. Come thou, do likewise, and start figuring how you can get to London in '57, to make these literally *World* conventions.

Editor's Comment: Before seeking to determine Whodunit, let's make

sure it was done. A lot of band-wagon-jumpers appear to have fallen off and been hurt. A number of cowboys wearing space-helmets appear to have bitten the dust. Quite a bit of would-be science-fiction has been slaughtered . . . if you can slaughter a shadow.

The genuine science-fiction efforts, however, seem mainly to have suffered a temporary annoyance as material witnesses to the said-to-be crime. Science-fiction is essentially prophecy; the good, sound, well-proven statement, however, isn't prophecy. The imitators tried the normally successful technique of imitating that which had been proven successful.

Look what happened!

For genuine science-fiction, author, editor and reader alike must do research—and that means try the unknown, the uncertain, the unreliable, the untried.

I'm not sure there's any "dunit" to "who" about.

J. W. C. Jr.

REACH FOR TOMORROW, by Arthur C. Clarke. Ballantine Books, New York. 1956. 166 pp. $2.00; paper 35¢

This is the poorest of the Clarke books to come from Ballantine, probably because it is the latest and the most traditional in the stories covered. What is in it is good enough compared with the competition, but not quite up to the author's own high standards.

The first story, "Rescue Party," which appeared here in 1945, was Clarke's first published story. He says: "a depressing number of people still consider it my best." I won't go that far, but this story of the rescuers who explore an abandoned Earth and unravel the mystery of where Man has gone is right up there with the best. "A Walk in the Dark" evokes a mood we have all felt, and makes another planet real with typical simplicity and economy.

"The Forgotten Enemy" is a negligible filler, but "Technical Error" is another "idea" story of dimensional physics and "The Parasite" shuttles back and forth across the vague boundary between sf and fantasy with its mental probing into the ultimate future. "The Fires Within" is another gimmicked yarn, built around an idea and a snapper-ending, and "The Awakening" is a vignette which Dunsany might have done somewhere between Jorkens and Pegana.

"Trouble With the Natives" is a wholly delightful episode of BEM anthropologists in an English village. "The Curse" is another slight mood-piece of a few hundred words, even more like Dunsany, and "Time's Arrow" is distinguished for its neat handling of a plot that even I have used: paleontologists and dinosaurs. "Jupiter Five," on the other hand, is pure space-action story-telling and very good, and the book closes with "The Possessed," one of the quietly penetrating little tales that Clarke does very well.

Some sales figures which Ballantine showed me last year indicated that Arthur Clarke is their best science-fiction property, topping even "The Space Merchants" by a big margin. He has the ability to do just about any kind of writing and do it well—he has a handsome new book on the Great Barrier Reef of Australia in the shops, as I write this. As I said at the beginning, he's done much better—but others are doing far worse.

THE BEST FROM FANTASY AND SCIENCE FICTION: FIFTH SERIES, edited by Anthony Boucher. Doubleday & Co., Garden City. 1956. 256 pp. $3.50

From one point of view, it must be enormously frustrating for an editor like Anthony Boucher to have to put the "Best" label on an annual collection which he knows perfectly well is not that and can't be. Other collections and anthologies have picked off stories which he would have to use, if the title were to be taken literally. On the other hand, he can meet the dilemma—as he does—by ignoring the publisher's series-title and simply putting together one terrific 256-page super-issue with the balance of science fiction and fantasy, comedy and tragedy, sublime and ridiculous, that characterizes *F&SF*. And it probably makes a better-reading book, if a less memorable one.

Let me first point out two features

that you won't ordinarily find in any other collection: snatches of delightful verse, and four ultra-shorts by Fredric Brown, James Blish, Isaac Asimov and the editor himself which are outrageous, corny, and quite wonderful. (Remember those other "vignettes" with which Brown spaced out his last book, "Angels and Spaceships"?) Let me also commend Doubleday on at long last putting the words "Fifth Series" on the spine, so that potential buyers don't glance at the main title and say, "Oh, I have that."

This time, setting aside the verse and the vignettes, the collection is overwhelmingly science fiction — twelve out of fifteen. The fantasies are Shirley Jackson's "One Ordinary Day, With Peanuts"—good enough so that it is also in Judith Merril's anthology — Charles Beaumont's "The Vanishing American," and Mildred Clingerman's impish "The Last Prophet." A good half of the science fiction roundly deserves the "best" tag, and of these the chiefest is again by Zenna Henderson, "Pottage," another of her tales of The People which are one day going to be fondly and thoughtfully woven into a memorable novel. Set off against it are the kosher-pickle savor of Avram Davidson's little classic, "The Golem"—both in Merril—Alice Eleanor Jones' bitter "Created He Them," Walter M. Miller's gently humorous "A Canticle for Leibowitz"—close to Anthony Boucher's own religious tales—Richard Matheson's typically atypical "Pat-

tern for Survival" with its flash of insight into what will keep a man sane, and Isaac Asimov's sf-detective yarn, pure adroit entertainment, "The Singing Bell."

What else? Plenty. From Arthur C. Clarke, "This Earth of Majesty," slight but human. From Mildred Clingerman of the Tucson Renaissance, "Birds Can't Count," sly and delicious. From Raymond E. Banks, "The Short Ones," which reflects upon the responsibilities of godhood. From P. M. Hubbard, "Botany Bay," rather old-fashioned and evident but nicely done. And closing the book, "The Last Word" by Chad Oliver and Charles Beaumont—of the *Playboy* Beaumonts—which devastates a whole plantation of sf perennials.

These annual collections may not be the most memorable on the shelves, but they are just about the most enjoyable.

THE POWER, by Frank M. Robinson. J. B. Lippincott Co., Philadelphia. 1956. 219 pp. $3.00

Here's another excellent proof that you can cross-breed science-fiction themes with the techniques of the modern mystery, without doing violence to either. It's evidence, too, of the retreat of the main-line publishers from the science-fiction field. Just as, for a time, the more off-trail mysteries have been sold as "psychological" or "suspense" novels, so this book is billed as "a novel of menace"—just another mystery.

Actually, "The Power," is a superman thriller, most of which has the form of a hunter-and-the-hunted yarn. It opens with a tingle in a meeting of the Navy Committee for Human Research, as a tiny paper umbrella spins madly on the head of a pin, driven by the strange power of some member of the group. It continues with a murder without weapons, and with Professor Bill Tanner in flight, trying to track down the mysterious, protean "Adam Hart" as his very identity dissolves behind him — records destroyed, memories of his existence wiped out, total strangers set to hunt him down. One by one he eliminates the other members of the Committee as possible identities for the *Homo superior* he is hunting, and one by one Hart destroys his allies . . .

This stands beside Isaac Asimov's "Caves of Steel" as probably the best marriage of s-f with one of the major lines in mystery fiction, the chase story. And the snapper at the end should take your head off!

CONTRABAND ROCKET, by Lee Correy.

THE FORGOTTEN PLANET, by Murray Leinster. Ace Books, N. Y. 1956. 143/175 pp. 35¢

In this Ace Double Novel the original half is a rather interesting story by "Lee Correy"—a rocket expert in his own name and right—which would be a top-notch teen-age book but doesn't quite measure up as

adult fare. It tells the story of a group of rocket hobbyists who buy, overhaul and get into space with a decrepit rocket freighter, to the consternation of duly constituted authorities who are trying to keep such things on a high, duly licensed professional level. The idea is grand and many of the touches are delightful, but you can't help feeling that it belongs in the Winston series.

The Leinster half, I'm sure, you know all about. These are the two very old short stories, plus the sequel commissioned by Hugo Gernsback for his *Science Fiction Plus,* woven into a long story about struggling humans in a world of giant insects.

FORBIDDEN AREA, by Pat Frank. J. B. Lippincott Co., Philadelphia. 1956. 252 pp. $3.50

The author of "Mr. Adam," that comedy-to-end-all-comedies of the post-annihilation world, has stepped just a little way ahead in his new book. The result is one of the tautest, best stories of the way the Last War may come to America, that anyone has written.

The date isn't specified, but in a year in which Christmas will fall on Monday (1961, 1967, 1972 . . .) Russia is ready to win the world with one massive attack on Christmas Eve, when most of the country's military will be home on leave, vigilance will be let down everywhere, most of the nation's big-city populace will be on the streets. If, for a generation or a century, it is necessary to mark the United States and Canada a "Forbidden Area," it's worth the price to have a free hand over the rest of the world.

We follow six men and a woman, representatives of the government's top services, who are the Intentions of the Enemy Group. It is their function to combine every scrap of

knowledge available into a plan for the destruction of America: a blueprint for war, as they would draft it if they were in Moscow instead of Washington. And then, item by item, the plan starts coming to life at the very moment when government brass, smug in its own self-sufficiency, pigeonholes their warning and dissolves the Group.

Except for its future setting, this is straight spy stuff, in which you run with the fox as well as the hounds. The build-up of suspense in the final pages is terrific. If Hollywood will refrain from improving on it, this should make a wonderful film—but then, so would "Mr. Adam" with Danny Kaye in the name part.

SURVIVAL IN THE SKY, by Charles Coombs. William Morrow & Co., N. Y. 1956. 256 pp. $3.75

This is a handsomely made book for high-school libraries—it has an index—which rather prosily and ploddingly goes over the story of our trans-sonic aircraft, the engineering and personnel problems which arise at those speeds, and what the Air Force—and others—are doing to cope with these problems. The illustrations, mostly beautifully crisp and clear, seem all to be official releases.

It's sound, it's unemotional, and the librarians can feel safe with it. Personally, I think any high-school boy will get a lot more out of something like Lloyd Mallan's "Men, Rockets and Space Rats" which dramatizes these same scenes and events, and brings the spacemen themselves to life.

THE BEST AMERICAN SHORT STORIES: 1955 edited by Martha Foley. Ballantine Books, New York. 1956. 422 pp. 50¢

Ballantine has now taken over this yearbook of the American short story, standard for no less than forty years. And among the twenty-four selections—from sources as varied as *The University of Kansas City Review, Accent, Botteghe Oscure,* and *Ladies' Home Journal*—is Judith Merril's fine "Dead Center" from *Fantasy & Science Fiction.* So far as I know, this is only the first or second time that science fiction has made the literary grade in this way—I believe a Bradbury story was included several years ago. However, Miss Foley is by no means stuffy in her tastes, for you will find several science-fiction and fantasy stories—including Tom Godwin's memorable "The Cold Equations" from this magazine—in her roster of distinctive stories.

THE WORLD JONES MADE, by Philip K. Dick.

AGENT OF THE UNKNOWN, by Margaret St. Clair. Ace Books, N. Y. 1956. 192/128 pp. 35¢

Here's another Ace bargain. Since Ace now ignores the little matter of magazine credits, I can't be sure, but I believe the Dick novel is an original and the St. Clair yarn a reprint, probably from one of the Standard magazines.

Jones is a man who can look just one year into the future, and who with that power builds up a highly disturbing society. He is a mutant of a seemingly mild kind, in a post-atomic-war world in which mutants of more overt kinds are no rarity—but his effects on the world of his time are far from mild. And in true van Vogtian manner, the author—can he *be* van Vogt in disguise?—mixes in a colony of utterly strange mutants and an amoebic invasion from the depths of space. It's fascinating, tumultuous, and a bit disorganized, but fun from start to finish.

I can't say as much for "Agent of the Unknown," in which Miss St. Clair combines the strange dreams produced by a Merrittesque weeping doll with an artificial world, several sets of plotters, and a fate-driven hero. It passes the time well—I enjoyed it, in fact—but being back-to-back with the really good "Jones" yarn doesn't help it much.

GUIDED MISSILES IN WAR AND PEACE, by Nels A. Parson, Jr. Harvard University Press, Cambridge, Mass. 1956. 161 pp. $3.50

The relatively low price of this book probably derives from the fact that readers who follow rocketry at all won't find much if anything new in it. This is strictly a primer for the lay public, written around two University of Southern California graduate theses. Major Parson was on the project that brought the first German rocket scientists to this country, and is now in the Army's Combat Developments section at Fort Monroe.

The first six of the ten chapters are simple, clearly written historical and physical summaries of what rockets are and how they fly, ending with a few notes on what kinds of rockets we now have. The last four chapters have to do with guided missiles *per se,* in their various permutations—air-to-air, air-to-ground, ground-to-air, ground-to-ground. The

illustrations are official, clear, and good.

Recommend this to your laymen friends who don't know a guided missile from a boomerang.

SPECIAL REVIEW

A SCIENTIFIC REPORT ON "THE SEARCH FOR BRIDEY MURPHY," edited by Dr. Milton V. Kline. The Julian Press, New York. $3.50

This book is, essentially, an authoritative statement that nobody but an authority like Dr. Kline knows anything about hypnosis—and that such authorities know all there is to know about it that's really important. The "Bridey Murphy" account is used mainly as a peg on which to hang a discussion of hypnosis-as-the-orthodox-see-it. It is my impression that having failed themselves to attract any considerable public interest, there is a deep resentment that the researches of an amateur like Morey Bernstein, author of "The Search for Bridey Murphy" have produced strong public interest.

Hypnosis is definitely not a scientific field; no one, professional or amateur, knows what an "hypnotic trance" is, what factors of mind make it possible, or what the laws relating to hypnosis are. The essential difference between Dr. Kline's approach and Morey Bernstein's is that Bernstein fully and freely acknowledges his ignorance, while Dr. Kline does not.

"The Search for Bridey Murphy" is certainly an incomplete, inadequate, and doubtful study; one of the major reasons why it has been widely studied is that it fully and frankly acknowledges its own inadequacies.

Dr. Kline, even hanging his hopes of wide sale on Mr. Bernstein's work, will not succeed appreciably better than other professional lecturers on hypnosis; Mr. Bernstein is the wiser man, for "he knows not, and knows that he knows not." Dr. Kline's attitude of "We professionals know all that it is important or necessary to know about the subject, and amateur researchers must not dabble their stupid little fingers in our professional field," is not encouraging public interest in the slightest.

Having had some personal experience with the profound professional ignorance as to the nature of the hypnotic phenomena, I am all for Morey Bernstein's highly successful effort to call attention to the lack of real understanding.

Highway Hypnosis remains a major menace; until Dr. Kline and other members of the Society for Clinical and Experimental Hypnosis can contribute something effective to that nation-wide problem they can properly claim knowledge, but have no right to claim authority or understanding.

J. W. C. Jr.

(*Continued from page* 8)
xenophobia of a primitive tribe; anyone who is not a member of the in-group is rejected on the grounds of complete distrust. Of course, a member of a neighboring tribe, who is an uncle's wife's nephew, can be admitted as a member of the in-group . . . but with uncomfortable tensions, because it may be necessary to reject this member of the in-group.

A datum which is a nephew of an uncle's wife to an already accepted datum can be admitted—under suspicion, of course, but admitted.

The problem is to work out a method whereby *any* idea can be *admitted for study.*

Trouble is, to study it, it must be given full-faith-and-trust. You can *not* determine how Tom Brown would be as a friend, if you insist on studying the question while treating him as an enemy. You can *not* study an hypothesis, while firmly rejecting it.

What's needed, perhaps, is a sort of separate compartment of the mind, something that will function sort of like an air lock. You can admit anything into the air-lock department for study—and give it full admittance only after it's been carefully studied in the enclosed environment of the air lock.

Agreed, this isn't perfect; you aren't giving it *full* faith-and-credence. Also, it involves compartmentalizing your own mind; the in-group data is now recognized as being sealed away from the out-world of reality! The air lock works two ways; your own data, seeking to go out in the world, must undergo testing-for-compatability in the air lock too.

For any human individual, "I" has an inherent tendency to be "the important Universe." It's a fact that when an "I" dies, a Universe is destroyed. From the internal viewpoint of the "I," that Universe tends to be *the* Universe. It's for certain-sure that it's the only Universe that "I" can ever possibly live in.

It's darned easy for the "I" to assume — to work-on-the-premise-that—the outer Universe is the lesser field. To him, it is less important, because he can never live in it—

the "I" can never live in it, whatever the body may be doing.

To accept that the "I-Universe" is the lesser of the two, that all the vast quantity of data, experience, and thought that is internal is the lesser system . . .

Look, how long did it take the human race to discover that the Universe external to Earth was actually as big as Earth itself? The geocentric viewpoint wasn't merely a matter of overweening and self-important pride; it was simply the result of the fact that the methods available allowed of measurement of Earth, to some extent, but did not allow of measurement of the external Universe.

The egocentric viewpoint isn't a matter of pride, of egotism in the usual sense. I can compare the magnitude of my desire to retain this ten-dollar-bill, and my desire for that electronic component; that's an internal measurement. But can I compare, accurately, my desire to retain this ten-dollar-bill, my desire for the electronic component . . . and my wife's desire for a pair of shoes?

The shift from geocentric to heliocentric cosmology came about when some conception of the ratio between terrestrial and astronomical scale became available. The shift from a heliocentric to a galactocentric cosmology is under way; they're still working out which arm of the local spiral galaxy the Sun is in.

The problem of an open mind seems to center around the measure of trust-distrust appropriate to the particular area involved. That's a problem of mensuration—and it is nowhere near as simple a mensuration problem as the problem of shifting from geocentric to heliocentric cosmology. That involved the simple matter of *distance* measurement. (Whatever distance is, and be it observed that there is no definition for distance; it's an arbitrary, fundamental postulate in terms of which other things are defined!) But what's the "distance" between complete trust and complete distrust?

A man is "nearer" a person he trusts, than he is to one he distrusts . . . as every fool can plainly understand.

The psi phenomena seem to be independent of distance . . . and why shouldn't they be? Two human beings who fully trust each other are "close as pages in a book," however distant they may be.

Which measure would you expect to be important in discussing telepathy—miles, or the distance that exists between two men who treat each other with distant politeness?

I can't, of course, know how many miles separate you, as you read this, from me—but I know that you and I are closer than one of my fellow-townsmen who has no use for that impractical and silly speculation, science fiction.

Anybody want to express the unit of that measure?

THE EDITOR.

—Continued from other side

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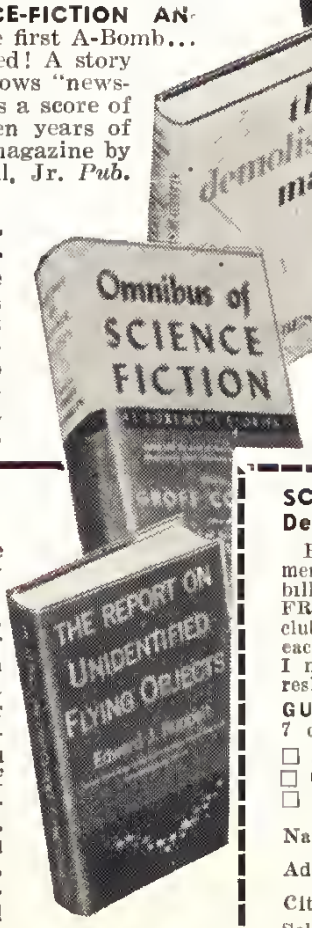

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